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AUTHOR Griffer, Mona R.
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ABSTRACT

This practicum report describes a project to teach preservice speech-language clinicians cost-effective and time-efficient methods for analyzing language sample assessment data used to design functional treatment programs for children with communicative/linguistic deficits. A technology curriculum was designed and implemented which emphasized computer-assisted analysis of language samples. The curriculum was designed to complement a required graduate level course in language disorders in children. The project also addressed software evaluation, designing templates for clinical reports, telecommunications, computer-assisted instruction, and ethical issues. Technology laboratories were conducted as was a series of technology workshops for faculty. Analysis of the data revealed that significant gains were made in increased knowledge and proficiency level of preservice clinicians and faculty, although 11 of the 17 outcomes were not achieved to the degree anticipated. Individual sections of the report present a statement of the problem, identification of anticipated outcomes and evaluation instruments, explanation of the solution strategy, and a report of the project's results. Appendices include the pre- and post-implementation surveys, a self-evaluation of technology skills questionnaire, a laboratory evaluation questionnaire, and a workshop program evaluation questionnaire. (Contains 108 references.) (DB)

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Facilitating Technology-Based Clinical Skills in Preservice Speech-Language Clinicians: Strategies for University Faculty

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by
Mona R. Griffer
Cluster 66

A Practicum II Report Presented to
the Ed.D. Program in Child and Youth Studies
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

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APPROVAL PAGE

This practicum took place as described.

Jack R Mills

Verifier: Dr. Jack Mills

Director, Master's Program in Speech-Language Pathology

Title

Ft. Lauderdale, FL

Address

Jan 2, 1997

Date

This Practicum report was submitted by Mona R. Griffer under the direction of the adviser listed below. It was submitted to the Ed.D. Program in Child and Youth Studies and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

Approved:

January 30, 1997

Date of Final Approval of Report

Roberta L. Schomburg

Roberta Schomburg, Ph.D.

Acknowledgments

This practicum is lovingly dedicated to my mother who taught me to strive for excellence and to the memory of my father who taught me that dreams can come true...thank you for helping me be all that I am and all that I hope to be; and to Dr. Lois Ann Hesser, a mentor, a colleague, and a dear friend, whose teaching excellence, care, and concern opened a new "window" in my life...thank you for motivating me to learn skills and achieve goals that initially exceeded my expectations.

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I am blessed with many wonderful, cherished friends who also happen to be highly valued colleagues. Thanks goes to all of them for their support, understanding, and interest in my professional endeavors. I am especially grateful to:

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Table of Contents

Page

Acknowledgements iii

Abstract vi

Chapter I: Introduction 1
- Description of Community 1
- Description of Work Setting 2
- Writer's Role 8

Chapter II: Study of the Problem 12
- Problem Statement 12
- Problem Description 12
- Problem Documentation 13
- Causative Analysis 16
- Relationship of the Problem to the Literature 18

Chapter III: Anticipated Outcomes and Evaluation Instruments 34
- Goals and Expectations 34
- Expected Outcomes 34
- Measurement of Outcomes 37

Chapter IV: Solution Strategy 39
- Statement of the Problem 39
- Discussion 39
- Description of Selected Solution Strategies 64
- Report of Action Taken 67

Chapter V: Results 78
- Results 78
- Discussion 94
- Recommendations 102
- Dissemination 104

References 106

Appendices
- A Pre-Implementation Technology Survey: Pediatric Language Assessment-Intervention 115
- B Post-Implementation Technology Survey: Pediatric Language Assessment-Intervention 120

C Self-Evaluation Rating of Technology Skills: Where Are You Now? 124
D LDC Technology Lab Evaluation 127
E Technology Training Workshop Program Evaluation 129

Tables

1 Comparison of Pre- and Post-Implementation Data Regarding Increased Knowledge and Proficiency in Technology-Based Clinical Skills of Graduate Students 85
2 Comparison of Pre- and Post-Implementation Data Regarding Increased Knowledge and Proficiency in Technology-Based Clinical Skills of Clinical Supervisors 92

Abstract

Facilitating Technology-Based Clinical Skills in Preservice Speech-Language Clinicians: Strategies for University Faculty. Griffer, Mona R., 1997. Practicum Report, Nova Southeastern University, Ed.D. Program in Child and Youth Studies. Speech-Language Pathology/Curriculum and Instruction/Higher Education/Educational Technology.

This practicum was designed to teach preservice speech-language clinicians to use cost-effective and time-efficient methods to analyze language sample assessment data to design functional treatment programs for children with communicative/linguistic deficits. The writer designed and implemented a technology curriculum that addressed topics compatible with those discussed in Language Disorders In Children (LDC), a required graduate level course. Computer-assisted language sample analysis was emphasized. Other topics discussed included software evaluation, designing templates for clinical reports, telecommunications, computer-assisted instruction, and ethical issues.

A leadership role was assumed when the writer instituted the new tech curriculum as a component of LDC and conducted a series of tech labs for graduate students enrolled in the course. Additionally, the writer developed and conducted a series of technology workshops designed for faculty to enhance their technology-based clinical skills. Furthermore, the writer collaborated with the faculty and staff at the university's microcomputer lab to coordinate programming such that the LDC tech labs and training workshops were held at this facility.

The practicum was regarded as moderately successful in that 6 out of the 17 anticipated outcomes were achieved to the degree projected. Analysis of the data revealed that significant gains were made in regard to increased knowledge and proficiency level of clinically-based technology skills of preservice clinicians and faculty, although 11 of the outcomes were not achieved to the degree anticipated. Interpretation of the data clearly indicated that topics addressing pertinent issues in regard to the use of computer technology in the pediatric language assessment-intervention process could be successfully infused into the academic and clinical components of a graduate preparation program in speech-language pathology.

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Chapter I: Introduction

Description of Community

The writer was employed in a county that is located in a southern state on the east coast of the United States. The community in which the writer is employed was located in the southwestern portion of the county, in the southeast region of the state. According to the 1990 census information, which the writer obtained from the Department of Strategic Planning and Growth Management of the Comprehensive Neighborhood Planning Division at the County Commissioner's Office, the population residing in the county was approximately 1,255,488 people (A. Pacer, personal communication, January 9, 1996). Of this population, approximately 74.5% were Caucasian, 15% were Afro-American, 9% were Hispanic, 1% were Asian, 1% were Native American, and less than 1% were other (Non-Hispanic).

The socioeconomic situation of the county was based upon the general parameters of annual household income, which were measured in five levels based upon a family of 2.35 persons per household (A. Pacer, personal communication, January 9, 1996). Approximately 2% of families fell within the first highest income level, which ranged greater than $99,999. Approximately 32% of families fell within the second highest income level, which ranged between $99,999 to $75,000. Approximately 15% of families fell within the third highest income level, which ranged between $74,999 to $50,000. Approximately 45% of families fell within the fourth highest income level, which ranged between $49,999 to $25,000. Approximately 6% of families fell within the fifth highest income level which ranged below $25,000.

Description of Work Setting

The writer was employed at an accredited, private university which offered graduate and undergraduate degrees in a variety of fields. The university, however, was best known for its graduate degree programs. The university was regarded as a leader among institutions of higher education that offer external degree programs so that professionals in various fields can earn advanced degrees. Distance education and campus-based opportunities using state-of-the-art technology to foster and enhance the learning experiences of students were offered. There were approximately 22,000 students enrolled in the various degree programs, making the university the largest private institution of higher education in the state.

The mission statement of the university is to provide outstanding educational programs throughout an individual's life span at convenient times and in convenient locations for students, in order to prepare them for leadership roles in business and the professions, by encouraging research and community service in an atmosphere that fosters creativity and innovative critical thinking, using technology where appropriate. The School of Education offered seven Master and eight Doctoral Degree programs in various aspects of education, family support, child and elder care administration, speech-language pathology, and technology.

The Programs in Communication Sciences and Disorders, in which the writer was employed, is housed in the School of Education. There were two components of the Master's Program for Speech-Language Pathology. The graduate education component of the preparation program was where students learned theoretical information and

completed academic coursework in normal communication development and various communication disorders. The clinical component of the program was where students completed diagnostic and clinical therapy practicums by applying their theoretical knowledge-base to practical clinical situations when working with clients and their families who have been referred to the university's speech-language-hearing training clinic. The requirements for the Master's Degree in Speech-Language Pathology were 48 credit hours and 375 clinical client-contact hours, at the time of this practicum. An additional 18 pre-requisite credit hours were required for students who entered the program without a background in speech-language pathology or audiology.

Two Professional Doctoral Programs, one in Speech-Language Pathology and one in Audiology, were being planned. These programs were expected to be offered in the 1997-1998 academic year.

The Programs in Communication Sciences and Disorders' had a mission statement. It was to provide clients and their families with the highest quality of comprehensive services and guidance in a professional atmosphere that encourages faculty and staff to interact with graduate students in a manner which facilitates the highest standard of compassion, competence, and quality of education and service.

The Communication Disorders Clinic, which was located on campus, consisted of approximately 8000 sq. ft. This building housed administrative and faculty offices; a conference room; a large classroom; four treatment/evaluation rooms with one-way glass and closed circuit video for observation capabilities; a small audiology suite with equipment for hearing evaluations and an aural rehabilitation treatment room; a client

waiting room; a billing and collection office; storage space for personnel, student, and client records and files; a receptionist's area; areas for support staff and office equipment; and a student workroom/lounge. The Speech-Language-Hearing Center Annex, which was also located on campus, provided an additional 8000 sq. ft. of space for the evaluation and treatment of adult clients, faculty offices, and a support staff area. An approved 18,000 sq. ft. extension has been designed. Fundraising for the expansion project has begun. The scheduled groundbreaking and completion dates have not, as yet, been announced. The expansion will provide additional space for therapy and evaluation rooms; faculty and support staff offices; counseling rooms; five large classrooms which can be subdivided into smaller classroom space or used for transdisciplinary clinical services; an augmentative communication laboratory; a voice-resonance-speech science laboratory; an audiological suite for electrophysiological testing, hearing aid repairs, and other audiological equipment; and a student workroom/lounge area.

At the time of this practicum, two hundred seventy-seven students were enrolled in the Master's Program for Speech-Language Pathology, 19 of whom were male and 258 of whom were female. Two-hundred seven students were enrolled in graduate level courses. Seventy students were currently enrolled in pre-requisite courses. There were 33 full-time students at the masters level. The university's definition of a full-time student was one who is enrolled for a minimum of 9 semester credits. Two hundred forty-four part-time students were enrolled in the program. These students were registered for less than 9 semester credits. Approximately 50% of the student body held Bachelor Degrees in Speech-Language Pathology. Of the approximate 50% of students

who were from out-of-field, 40% held Bachelor Degrees in Psychology, 40% held Bachelor Degrees in Education, 10% held Bachelor Degrees in business related fields, and 10% held Bachelor Degrees in other fields.

The Master's Degree Program in Speech-Language Pathology was a campus-based program that attracted students living throughout the United States, Canada, and South America. This lent itself to a somewhat culturally diverse student body. Approximately 65% of the student body were Caucasian, 25% were Hispanic, 10% were Afro-American, 0% were Asian, and 0% were Native American.

Approximately 80% of the student body accepted to the program were out-of-state residents. Once accepted to the program, approximately 95% of these students relocated to the tri-county area surrounding the university. Approximately 75% of these students resided in the county in which the university is located and the other 25% resided in the counties either just north, south, or west of where the university is situated. Approximately 20% of the students accepted to the program were in-state residents. Ninety-eight percent of these students either lived or relocated to the tri-county area which surrounds the university. Two percent of these students either lived or relocated to the county just west of where the university is located.

Based upon the general parameters used for measurement of annual household income within the county that houses the university, approximately 9% of the student body fell within the second highest income level, 80% fell within the third highest income level, 10% fell within the fourth highest income level, and 1% fell within the first highest income level. In August 1994, the State's Department of Education granted

$215,000 in funds to the Master's Program in Speech-Language Pathology to offset the cost differential between the university's tuition and the tuition at public universities throughout the state. This allowed students to pursue a master's degree in speech-language pathology at the university who typically would not have been able to afford the cost of tuition.

The Programs in Communication Sciences and Disorders' faculty was comprised of 28 members, five of whom were male and 23 of whom were female. Two faculty members were Hispanic and the other 26 faculty members were Caucasian. Of the 21 full-time faculty members, seven held the rank of Program Professor; five held positions as the Coordinator of either Research, Clinic Client Services, Clinic Business Services, Internships, or Doctoral Studies; seven held the rank of Clinical Supervisor/Instructor of Speech-Language Pathology; one held the rank of Clinical Supervisor/Instructor of Audiology, and one held the position of Academic Advisor. Of the 7 part-time faculty members, three held the rank of Clinical Supervisor of Speech-Language Pathology, one held the rank of Clinical Supervisor of Audiology, two held the rank of Adjunct Lecturer, and one held the position of Academic Advisor. The support staff was comprised of nine female, Caucasian members who held the following positions: (a) one Coordinator of Administrative Operations; (b) one Coordinator of Billing; (c) two Administrative Assistants; (d) one Billing Clerk; (e) two Receptionists; and (f) two Clerical Assistants.

The department maintained an administrative relationship with the Family and School Center on campus. Psychologists at the Family Center conducted numerous developmental and psychoeducational evaluations, provided a range of support services,

and often served as members on interdisciplinary teams with Clinical Supervisors of Speech-Language Pathology and/or Audiology. The Family Center also offered a community toddler and pre-school program for typically developing children. The university also had a private elementary, middle, and high school on campus. Clinical Supervisors and graduate student clinicians conducted annual speech-language and hearing screenings and served as consultants, on an as needed basis, for these children and their families.

The university also housed a private school for children with language-learning disabilities and/or hearing impairments from Kindergarten through eighth grade and a preschool for children with autism and other developmental disabilities through a contract with the local school board. These schools for children with special needs served as a clinical laboratory for training and research for Professors, Clinical Supervisors, and graduate student clinicians.

The focus of this practicum involved graduate students enrolled in Language Disorders in Children and Clinical Supervisors who work with preservice clinicians assessing and/or treating pediatric clients. There were approximately 40-60 graduate students enrolled in Language Disorders each semester. Approximately 15-20 of these students were permitted to register for a particular section. There were usually two or three sections offered each semester, with three semesters comprising the academic year. Two full-time faculty members taught two of the sections. Either one part-time faculty member or an adjunct lecturer taught the third section, which was scheduled as needed.

There were eight full-time and two part-time faculty members involved in supervising preservice clinicians working with pediatric clients. These faculty members supervised graduate students enrolled in Diagnostic and/or Clinical Practicums.

Writer's Role

The writer was employed as a Clinical Supervisor/Instructor of Speech-Language Pathology. Instructional responsibilities included teaching graduate level courses in Language Disorders In Children, Diagnostics Lab, Clinic Methods, and Clinic Lab.

The writer taught one section of Language Disorders in Children each semester. The curriculum for Language Disorders In Children was developed by the writer with input from other faculty members. It focused upon teaching students the theoretical knowledge necessary to identify, assess, and treat a range of communication and language problems found in infancy, early childhood, older school-aged children, and adolescents. The writer was given the additional responsibilities of designing a technology curriculum and developing a technology lab course for all graduate students enrolled in Language Disorders in Children, due to the nature of this practicum. The new curriculum and tech lab was infused into the existing Language Disorders in Children course.

The writer also taught one of the clinical courses on a semester rotation basis. Diagnostic Lab was a weekly seminar that preservice clinicians were required to take concurrently with their Diagnostic Practicum. The curriculum, which was designed by the writer, emphasized a family-centered approach to the speech-language assessment process. Preservice clinicians were taught the application and interpretation of all

aspects of the evaluation process through facilitative discussions and case presentations.

Clinic Methods and Clinic Lab were seminar courses that graduate student clinicians were required to take concurrently with their two on-campus clinical therapy practicums. The curricula emphasized the application of all aspects of the therapeutic process through facilitative discussions and clinical case presentations. Students were taught to understand the continuum of the supervisory learning process and were provided with opportunities to learn and explore different models of supervision through role-play, demonstration, and videotaped supervisor-supervisee conferences.

Clinical supervisory responsibilities related to diagnostics included the development and implementation of diagnostic protocols that were designed to assess the socio-cognitive-communicative-linguistic skills of young children referred for evaluations. This role involved training graduate students, who were assigned to one or two diagnostic teams, in the critical thinking process involved in the following:

1. Decision-making related to selecting, administering, and scoring assessment protocols, criterion-referenced measures, and standardized tests.
2. Conducting informal assessment procedures and clinical observations.
3. Reviewing case history information.
4. Conducting parent/caregiver interviews.
5. Conducting effective family assessments.
6. Formulating clinical impressions and recommendations.
7. Conducting culturally sensitive, family-centered speech-language assessments.

8. Writing clinical communication reports.

Responsibilities also included coordinating and conducting all early intervention communication assessments for children between the ages of birth to three years who were eligible for Part H funding under the Individual Disabilities Education Act (IDEA), otherwise known as PL 101-476.

Clinical supervisory responsibilities related to therapy involved training graduate student clinicians to develop and implement appropriate treatment plans to remediate a variety of pediatric speech, language, communication delays/disorders, and/or oral-motor deficits. This role involved training graduate student clinicians in the critical thinking process involved in the following:

1. Decision-making related to formulating appropriate treatment objectives.
2. Selecting and implementing appropriate treatment methodologies, techniques, and strategies.
3. Providing rationales for treatment decisions.
4. Designing effective task analyses and home programs.
5. Recording client responses and data collection techniques.
6. Determining appropriate reinforcement strategies and effective behavior management techniques.
7. Writing clinical reports and other required documentation.
8. Involving families in the therapeutic intervention process.
9. Participating as an active team member with other professionals.

Additional responsibilities the writer assumed included serving as a member of the Curriculum and Faculty/Staff/Student Welfare Committees in order to continue developing, implementing, and evaluating objectives consistent with the department's and the university's strategic plan and mission statement. Furthermore, the writer served as a member of the Competency-Based Clinic Committee. Members of this ad hoc committee of the Communication Disorders Clinic Committee were charged with the responsibility of developing competencies that preservice clinicians were required to demonstrate prior to receiving approval to begin their off-campus clinical internships.

Chapter II: Study of the Problem

Problem Statement

The problem to be solved in this practicum was that preservice speech-language clinicians were not using cost-effective and time-efficient methods to analyze language sample assessment data to design functional treatment programs for children with communicative/linguistic deficits.

Problem Description

Graduate students enrolled in Language Disorders in Children and clinical supervisors who work with these preservice speech-language clinicians assessing and/or treating pediatric clients were the individuals involved with this problem. The significant difficulties being encountered were that graduate students were not aware of new strategies to add to traditional assessment-intervention approaches that could optimize time and effectiveness. A primary concern in regard to training was that preservice clinicians were not adequately educated in regard to computer applications appropriate for use in the pediatric assessment-intervention process.

Many issues concerning the content areas of the existing curriculum were factors perpetuating this problem. Topics addressing the use of microcomputer technology were not infused into any aspect of the graduate education/clinical preparation curriculum or practicum experiences. Specifically, training in computer-assisted language and phonological analyses were not part of the required Language Disorders in Children, Phonological Disorders, or Diagnostics courses. Additionally, research papers and/or projects incorporating the need for technology were not required in any course or clinical

practicum by any clinical supervisor or instructor. Furthermore, the vast majority of faculty members were not incorporating computer-assisted instruction into their teaching practices and instructional strategies.

Another factor contributing to this problem was that of space. At the time of this practicum, there was inadequate space in the building which housed the speech-language-hearing clinic to design a technology lab with state-of-the-art equipment.

The writer believed that the reason this problem had not been solved was because faculty members had not attempted to investigate the causes of the problem, particularly in regard to incorporating topics related to the use of microcomputer technology into the existing curriculum. They were not, therefore, able to generate appropriate solution strategies to resolve the situation.

Problem Documentation

The writer obtained evidence that supported the existence of this problem from a variety of sources. A technology survey was administered to graduate students enrolled in Language Disorders in Children (LDC) and faculty members responsible for supervising/instructing preservice clinicians working with pediatric clients (see Appendix A). Discussions with colleagues, interviews with graduate student clinicians enrolled in Diagnostic and/or Clinical Practicums, and the writer's personal review of academic and clinical course syllabi and the minutes from Curriculum Committee meetings also supported these findings.

Administration of the Pre-Implementation Technology Survey: Pediatric Language Assessment-Intervention (see Appendix A) revealed the following results,

which supported evidence of the problem:

1. Only 11 out of 65 graduate students rated their ability to code the content-form-use of a child's utterances using traditional language sample approaches as good.

2. Only 2 out of 65 graduate students had experience with a computer-assisted language sample analysis (CALSA) software program.

3. Zero out of 65 rated graduate students rated their ability to code a child's utterances using a CALSA software program as good.

4. Only 19 out of 65 graduate students rated their ability to prepare a template using a word processor as good.

5. Only 3 out of 65 graduate students were familiar with literature addressing ethical concerns in the use of microcomputer technology within the field of Speech-Language Pathology (SLP).

6. Zero out of 65 graduate students demonstrated adequate knowledge about areas of ethical concern that could be of major importance to the field , as evidenced by their inability to list more than three relevant comments.

7. Only 1 out of 65 graduate students were familiar with guidelines suggested by the American Speech-Language-Hearing Association (ASHA) for evaluating software.

8. Only 8 out of 65 graduate students demonstrated adequate knowledge about areas to consider when evaluating software for use in the pediatric speech-language assessment-intervention process, as evidenced by their ability to list more than three relevant comments.

9. Only 4 out of 12 faculty members who supervise/instruct preservice clinicians working with pediatric clients had experience with a CALSA software program.

10. Only 2 out of these 12 faculty members rated their ability to code a child's utterances using a CALSA software program as good.

11. Only 1 of these 12 faculty members rated their ability to prepare a template using a word processor as good.

12. Only 3 out of these 12 faculty members were familiar with literature addressing ethical concerns in the use of microcomputer technology within the field of SLP.

13. Only 2 out of these 12 faculty members demonstrated adequate knowledge about areas of ethical concern that could be of major importance to the field, as evidenced by their ability to list more than three relevant comments.

14. Only 3 out of these 12 faculty members were familiar with guidelines suggested by ASHA for evaluating software.

15. Only 2 out of these 12 faculty members demonstrated adequate knowledge about areas to consider when evaluating software for use in the pediatric speech-language assessment-intervention process, as evidenced by their ability to list more than three relevant comments.

16. Only 2 out of these 12 faculty members often discussed topics related to the use of microcomputer technology with their students.

17. Only 2 out of these 12 faculty members often assigned research papers

and/or projects incorporating the use of microcomputer technology into their academic courses or clinical labs.

Causative Analysis

There were many causes that led to the problem. Issues related to the academic/clinical curriculum requirements were the most significant factors. Language Disorders in Children is one of the first graduate level courses that students take as part of their academic education and clinical training. It is here that preservice clinicians learn the necessary theoretical knowledge to identify, assess, and treat a range of communication/language problems found in infants, toddlers, preschoolers, school-aged children, and adolescents. Collection, analysis, and interpretation of language samples are critical skills in order to develop functional communication/language therapy programs for pediatric clients. The current course curriculum reflected that language samples were discussed in regard to analysis and interpretation of data using only one of the traditional manual approaches. Students were only required to apply one traditional manual approach to analyze and interpret a language sample from a child who exhibits delayed or disordered language. Additionally, the current curriculum did not reflect topics concerning software evaluation, computer-assisted instruction during the intervention process, and ethics. Students, therefore, were not prepared to consider these important issues in regard to the use of microcomputer technology when assessing and/or treating pediatric clients with communicative/linguistic deficits.

Issues related to faculty members unfamiliarity with the possibilities that microcomputer technology holds for speech-language pathologists and scheduling of

faculty were also critical factors. The vast majority of faculty members were not proficient with current software applications that were designed to analyze language samples obtained from pediatric clients. The department's Associate Director of Academic Curriculum and the former Clinic Coordinator previously purchased two computer-assisted language sample analysis software programs. It was no longer financially sound to purchase upgrades for these programs because they were outdated. Furthermore, faculty members were not aware of issues related to the use of microcomputer technology that are important within the field of Speech-Language Pathology. They, therefore, could not share information concerning software evaluation, computer-assisted instruction, and ethical issues with preservice clinicians. Additionally, clinical supervisors/instructors who were responsible for preparing preservice clinicians to work with pediatric populations were not given flexible schedules that allowed them to take computer courses offered at the university in order to develop/enhance their technology skills.

Space was also a factor. Due to the increased enrollment of students into the Master's Program in Speech-Language Pathology coupled with the hiring of new faculty and staff to fill recently created positions, office and treatment space was significantly limited. Therefore, there was no room to design a microcomputer technology lab in the clinic. Furthermore, graduate students and clinical supervisors had no access to microcomputer facilities at convenient times and in reasonable locations close to the clinic.

Relationship of the Problem to the Literature

An extensive survey of the literature that spanned the following topical areas suggested that other professionals, whose interests involved the use of innovative strategies to prepare students for clinical/educational professional roles, were also concerned about the problem: (a) speech-language pathology and audiology; (b) educational technology; (c) higher education; (d) regular education; (e) special education; (f) educational leadership; (g) curriculum and instruction; (h) computer science; (i) library and information science; (j) business and management; (k) cognitive psychology; (l) educational psychology; and (m) behavioral psychology.

The literature review revealed that technology has been and continues to be the key impetus in facilitating rapid changes in medicine, business, and industry, as we approach the 21st century. Thornburg (1991) expressed that changes have also occurred in education, although, to a lesser extent and at a much slower rate. Significant advances in technology have implications for restructuring and reforming traditional curricula and instruction at all levels of education, as a result of the information age (Albright & Graf, 1992; Graf, Albright, & Wheeler, 1992; McDaniel, 1995; Thornburg, 1992, 1994).

Gelatt (1987) averred that negative outcomes were highly probable if professional speech-language clinicians fail to recognize the crucial and justifiable roles that microcomputers play in the discipline of Communication Sciences and Disorders. He stated that clinicians run the risk of placing the profession at a significant disadvantage over other clinical/educational disciplines if they do not actively seek to incorporate technology into their clinical practices.

Goldberg (1995) and Steckol (1995) discussed the impact of the information age on the professions of Speech-Language Pathology and Audiology. Goldberg (1995) emphasized the importance of adapting to change by adopting a philosophy of continual learning, developing multidirectional critical thinking skills, enhancing technology skills, and keeping apprised of technological advances in order to remain competitive in the professional marketplace. Steckol (1995) polled members of the American Speech-Language-Hearing Association (ASHA), who are recognized as leaders in various aspects of the profession, in regard to their insightful predictions about the future of the professional organization and the field. Many ASHA leaders commented upon technological advances that are and will continue to transform professional roles and responsibilities.

ASHA sponsored an Academic Colloquy in December 1994. This forum provided an opportunity for leaders and members of the Association, who represented various universities and different clinical/educational work settings, to discuss critical issues in regard to academic and clinical education facing clinical preparation programs in Communication Sciences and Disorders (Kellum, 1994). Current issues and trends occurring in the fields of Speech-Language Pathology and Audiology in regard to public law mandates, inclusive education practices, managed health care reform, perspectives of employers, changes in scope of practice, and the critical shortage of qualified personnel have impacted upon the expectation of professional speech-language pathologists and audiologists (Logemann, 1994a). Spahr (1994) discussed the paradigm shift in today's marketplace in regard to cost containment. There continues to be greater and greater

demands placed upon clinicians to evaluate more clients, interpret assessment information, generate and implement effective therapy programs, disseminate information, and treat increased numbers and diverse populations of clients in significantly decreased time frames (Logemann, 1994b). Participants discussed the importance of investigating new strategies to add to traditional approaches that could optimize time and enhance effectiveness (Davis, 1994; Ferraro, 1994; Flahive, 1994; Guilford, 1994; Thies, 1994).

The literature provided documentation and evidence to support the existence of the problem stated in this practicum. ASHA recognized the importance of computers to facilitate cost-effective measures in regard to clinical service delivery as well as the opportunity to enhance the public image of the profession by taking a leadership role at the initial stages of the technology revolution (Cooper et al., 1985). These authors developed a resource guide to facilitate the integration of technology into graduate education/clinical preparation programs in Communication Sciences and Disorders, in an effort to support proactive change. The purpose of the technology resource guide was as follows:

1. To propose various types and degrees of participation in order to assist academicians and clinical program directors to take leadership roles.

2. To suggest strategies to infuse technology and computer literacy competencies into graduate level curricula.

3. To identify avenues for disseminating and discussing experiences, ideas, and information that would encourage and facilitate the infusion process.

Chial (1986a) developed a strategic plan which highlighted strategies and discussed obstacles to integrating technology into professional preparation programs in Communication Sciences and Disorders. He stressed the importance of recognizing, identifying, and attending to program goals, marketplace issues, operational issues, and error avoidance in developing computer facilities for students. Bull (1989) and Cochran (1989) indicated that although computer technology was frequently used for administrative applications (e.g., word processing, spreadsheets, and databases), it was rarely, if ever, used for assessment and intervention purposes in the clinical process.

Miller & Lyngaas (1995) expressed concerns in that few professional speech-language pathologists routinely used language sample analysis (LSA) procedures in their daily clinical practice. Miller stressed the importance of LSA to obtain a diagnostic profile about a child's communicative/linguistic skills and patterns in order to design effective, functional treatment programs as compared with information acquired through standardized testing.

The importance of emerging technological trends must be recognized by higher educators who are beginning to influence and transform universities. Razik & Nalbone (1990) suggested new technologies significantly impacting upon higher education included hypermedia, simulation, and artificial intelligence in the form of expert systems. These authors discussed the role of universities and higher educators as critical change agents in the complex relationship between emerging technologies and social change. They stressed the need for higher educators to collaborate with industry and government to use emerging technologies effectively, restructure universities so that

innovative technologies are infused within their operations, and take a leadership role in addressing the significant social concern of our "information-and-service-based economy" (p. 66) brought about by these technological advances.

Lowenstein & Barbee (1990) reported that these emerging technologies are crucial to enhancing responsibility, establishing and maintaining educational environments that are learning-oriented rather than teaching-oriented, facilitating new depth and scope in our thinking and learning, and bridging the gap between theory and application to solve real-world problems. Ritcher (1992) suggested that technology and education are interrelated in that emerging technologies are a continual process approach to solving educational problems, rather than merely hardware and software.

Pea & Gomez (1992) discussed that new research in learning theories and cognitive sciences indicated that the utilization of interactive multimedia technologies (IMT) facilitates a shift from the traditional educational paradigm to integrated learning styles. They emphasized that IMT contextualized learning from a practitioner's perspective, incorporated educational materials that are learning-oriented, and facilitated skills and concepts from genuine real-world activities. This new paradigm portrayed the role of educators as models, catalysts, and facilitators of interactive discussions designed to proactively transform the learner into utilizing concepts and skills which result in effective performance-based outcomes.

The literature revealed several causes for speech-language clinicians not using cost-effective and time-efficient methods in the assessment-intervention clinical process. The information age had resulted in a group of people, who, according to Ermann,

Willaims, & Gutierrez (1990) were doubters of computer technology. These people professed that technological advances should be viewed with caution and skepticism. They believed that individuals and organizations within our society have less consensus about ethical standards and frequently hold to multiple, ever-changing, and conflicting values and goals. Doubters were concerned and fearful that skilled computer users who have access to data may use this technology to facilitate their own interests, power, and influence. Furthermore, doubters thought that computerization will result in a loss of basic human rights such as privacy and deskilling of jobs, and will lead to increased unemployment (Ermann, Williams, & Gutierrez, 1990).

State goals for higher education in regard to information technology have not traditionally been concerned about issues related to access, equity, efficiency, diversity, quality, and economic development (Jonsen & Johnstone, 1991). These authors suggested that institutions of higher education have not changed their role from disseminators of knowledge to facilitators of knowledge, in keeping with the technological advances of the information age.

There were several factors in regard to attitude that negatively impact upon an individual's use of computer technology. Marcinkiewicz (1993-94) stated that a lack of harmony and conciliation exits between educators and computers. He suggested that complete infusion of computer technology into the educational system is unlikely to occur in the foreseeable future unless this issue can be resolved.

Fitch (1989) and McFarlane (1990) expressed that speech-language clinicians often failed to recognize that clinical skills, knowledge, and sound clinical judgements

are not inferior to, nor will they be replaced by, the use of computers. Larson & Whiteside (1986) stated that "the introduction of microcomputers had not included systematic accountability concerning the effect of this innovation upon its users" (p. 8) in university Communication Sciences and Disorders clinical preparation programs. They suggested that further investigation in regard to feelings, reactions, and attitudes of preservice clinicians was warranted. A study conducted by Pope-Davis & Vispoel (1992) that involved assessing the attitudes of 194 undergraduate and graduate students in regard to the impact of computer training supported Larson's & Whiteside's (1986) beliefs.

Anxiety about technology and computer use may result in individuals being resistant and reluctant to this innovation. This may lead to repression of their aptitude to learn and develop computer skills, which may negatively impact upon their education, employment opportunities, professional development, and efficiency (Igbaria & Parasuraman, 1989; Howard, 1986; Koohang, 1986). Lack of computer experience has been shown to negatively impact upon one's computer anxiety (Chen, 1986; Dukes, Discenza, & Couger, 1989). An individual's confidence level in the outcome of a specific computer application has been shown to negatively impact upon one's level of computer anxiety (Glass & Knoght, 1988; Heinssen, Glass, & Knight, 1987).

Cognitive style has been shown to directly affect an individual's ability about decision-making, information processing, and anxiety in regard to computer use (Igbaria & Parasuraman, 1989). Kay (1993) assessed computer attitudes of 647 preservice teachers by examining the cognitive, affective, behavioral, and perceived control constructs through the administration of the Computer Attitude Measure (CAM). Results

indicated that the positive attitudes were highly positively correlated with computer ability. Additionally, the author's research confirmed that there was a need for training in awareness and applied skill if attitudes towards computer use were to be improved among preservice educators.

There were numerous issues related to technology and social change that hindered the use of innovative, cost-effective, and time-efficient strategies by preservice speech-language clinicians. Gelatt & Minghetti (1989) voiced the following concerns in regard to the technology revolution that has occurred in our society:

1. The leaders in technology were not necessarily members of ASHA or professionals within the communication sciences and disorders field.

2. ASHA and speech-language pathology and audiology practitioners have not clearly delineated the role that professionals within the communication sciences and disorders field can and should take in regard to technology.

Spahr (1994) discussed the lack of competency-based technology skills in academic/clinical education training programs. He stressed the importance of restructuring speech-language pathology and audiology graduate level curricula to include applied technology, teaming, and interpersonal communication skills in order to best prepare graduate student clinicians to face the demands of today's varied professional roles, responsibilities, and work settings.

Massey, Wilger, & Colbeck (1994) discussed factors related to the lack of innovations in academic preparation. These authors attributed the problem to a lack of open and honest discussion among faculty members both within and across specific

disciplines. Factors contributing to this communication breakdown included a desire and a need for independence, special professional interests, generation gaps, a lack of general human courteousness, and one's own personal agenda, according to the authors. They also stressed that traditional collegiality has interfered with proactive decision-making and problem solving because it prevents in-depth and, at times, controversial discussions necessary to facilitate change towards improving and/or enhancing the educational system.

At the ASHA Colloquy, Goldsmith, Fagan, & Battle (1994) facilitated discussions relevant to issues in academia. Participants identified faculty development and improved curriculum and instruction as two components critical to academic and clinical preparation of preservice speech-language pathologists and audiologists for professional roles. Ferraro (1994) raised concerns in regard to the lack of competency-based instruction integrated into all aspects of academic/clinical education preparation programs in Communication Sciences and Disorders. He averred that there is limited use of cost-effective technological methods, whether instruction took place in the traditional classroom environment, in on- or off-campus practica settings, and/or in research laboratories. Ferraro (1994) attested that barriers to enhancing faculty development and improving instruction included costs related to developing technology for instructional purposes, a lack of administrative and financial support for faculty members who want to infuse technology into their curricula, empirical data documenting the efficacy of cost-effective and time-efficient technological applications, and general reluctance to change.

Razik & Nabone (1990) expressed concerns in that higher educators and university administrators have been slow to respond to critical social issues in regard to the paradigm "shift from a material- and product-based economy to an information- and service-based economy" (p. 66) which has occurred as a result of technological advances in our society. In particular, there was a lack of consultation, collaboration, and the forming of partnerships between higher education with businesses and government agencies to develop mission statements and strategic plans that incorporate the use of innovative technologies, according to these authors.

There was a lack of awareness within our society concerning significant ethical issues that have emerged as a result of the technological advances brought about by the information age. Several authors have discussed ethical issues related to information accuracy, information privacy, unauthorized use of computer systems, copyright, restricted access to qualified personnel, efficacy of using computer technology, and the validity and effectiveness of computer-assisted software programs (Dale, 1993; Ford, 1993; Larson & Steiner, 1988; Shelly, Cashman, Waggoner, & Waggoner, 1995; Taber-Brown, 1993; Zangari & Newby, 1991). Zangari & Newby (1991) stressed the importance of faculty members and clinical supervisors, who provide information on computer use and/or hands-on training with software applications, having a moral responsibility to teach their students about ethical issues related to computer use and technological advances. Dale (1993) suggested that many computer users lack an understanding of the legal and ethical issues related to the information age and, therefore, fail to see the illegality and immorality of computer crimes.

There were several factors related to why speech-language clinicians are reluctant to use computer technology with their clients. Based upon results of ASHA's 1991 Omnibus Survey, only 43.6% of clinicians said they used computers in the assessment-intervention process as compared to the 70.6% who responded that they used technology for this purpose on the 1989 Omnibus Survey (Masterson, 1995; Shewan, 1989). This represented a 27% decrease in computer use for client evaluation and treatment, according to Masterson (1995).

Lack of training was one of the most frequently expressed reasons for limited use of computers in the clinical assessment-intervention process (Bull, 1989; Cochran, 1989; Houle, 1988; McRay & Fitch, 1996). Fox (1990) suggested that the vast majority of computer training programs were not geared towards meeting the needs of practicing clinicians, which may account for why speech-language pathologists and audiologists are hesitant about taking computer courses.

Lack of convenient accessibility to computers continues to be an obstacle for speech-language clinicians, particularly in school settings (Cochran & Masterson, 1995; McRay & Fitch, 1996). Ray (1991) pointed out that public educational institutions in the United States have traditionally had difficulty keeping abreast of technological progress.

Other factors that impede the use of computers and clinical applications, especially by public school clinicians, included the following, according to Cochran & Masterson (1995), McRay & Fitch (1996), and Sarachan-Deily (1990):

1. A lack of or limited access to computer resources and/or outdated equipment/software.

2. A lack of confidence in regard to efficacy of computer-generated information.

3. Concerns in regard to students being fearful and hesitant about using a computer.

4. Concerns about the amount of time spent teaching children how to use the computer, the terminology associated with computer use, and how to use specific software applications as opposed to the time needed for implementing communication goals.

5. The challenge of obtaining and maintaining administrative support.

6. The challenge of maintaining current hardware and software applications.

7. The lack of preservice and inservice training in regard to using computers with children who have special needs.

Sarachan-Deily (1990) also stated that additional factors precluding the use of microcomputers by speech-language clinicians working in educational settings included issues related to controversies over which hardware/software brand are better to purchase, the amount of time necessary to learn about using the hardware and specific software programs, and issues related to equity of access among clinicians, regular education teachers, and special education teachers. Dustrude (1990) commented about the inequity of access to computers between clinicians and educators in many school districts where technology was commonly used. He also stated that many of his colleagues' proposals to either develop or improve computer access were denied by school and district level administrators.

Cochran & Masterson (1995) and Larson & Steiner (1988) pointed out the danger of clinicians selecting software for clinical applications that are inconsistent with their theoretical perspectives in regard to evaluation and treatment. Larson & Steiner (1988) expressed concerns in regard to clinicians who use technology without careful evaluation of the type of hardware and software prior to its use. They suggested that clinicians may select software without fully understanding the confines of the program, which may result in generating inaccurate yet persuasive data. Larson & Steiner (1988) stressed the importance for clinicians to support their clinical judgements, principles, and decisions, which should be based upon sound theoretical philosophies consistent with their beliefs, whether or not technology is a tool used during the clinical process. Fox (1990) stated that clinicians who used commercially available software for treatment purposes put themselves at risk for having to find clients whose communication needs fit the type of objectives and activities dictated by the program.

Miller & Marriner (1986) stated concerns regarding the accepted criteria used for evaluating intervention software for use with children who exhibited speech and language deficits. These authors proposed that the model suggested by Rushakoff (1984) failed to consider the origin and nature of language, the role of language in interpersonal communication, and the varied and different learning objectives. Miller & Marriner (1986) cautioned clinicians about the use of computer-assisted language intervention software applications that emphasized rote drill-and-practice tasks.

Miller & Lyngaas (1995) and Schwartz (1989) voiced concerns in regard to the infrequent use with which speech-language clinicians working with children who

exhibited language deficits performed language sample analysis procedures. Miller & Lyngaas (1995) attributed the primary reason to the amount of time required to analyze and interpret the data, which clinicians were rarely afforded. Another factor involved the lack of established criteria for explaining results for school-aged children. Schwartz (1989) averred that the only acceptable reason, from his perspective, that clinicians could offer to justify their resistance to using computer-assisted language sample analysis programs, was that historically these applications generated complex tables and figures that made it difficult for busy clinicians to decipher information for therapeutic planning purposes.

Graduate education programs in Communication Sciences and Disorders were not adequately preparing preservice clinicians to use cost-effective and time-efficient innovative technologies. Historically, computers were rarely used during the clinical assessment-intervention process because "they lacked the capabilities for production and analysis of stimuli involving sounds and images" (Bull, 1989, p. 105). Bull (1989) and Schwartz (1989) predicted that technologies in the 1990's would be more flexible and powerful, and easier to install and operate. Bull (1989) stated that regardless of these advanced technological possibilities, issues concerning training techniques and culture would remain determinant factors in regard to the extent to which technology was utilized by preservice and professional clinicians.

Cochran (1989) and Cochran & Bull (1992) expressed concerns regarding the lack of a culture that professed an ideology of clinical computer use. These authors expressed a need for a supportive and nurturing environment that invited and encouraged

preservice and professional clinicians to experiment with software applications that could be used during the clinical process. Cochran & Bull (1992) stated that computer-based competencies need to be valued by academicians and clinical supervisors responsible for instructing undergraduates and graduate student clinicians.

Zangari & Newby (1991) suggested that there is a lack of training in regard to computer knowledge, computer instruction, and applied technological skills occurring in university Communication Sciences and Disorders programs. These authors stressed the importance for faculty and administrators in speech-language-hearing clinical preparation programs to revise curricula to include these technology experiences for preservice clinicians.

Higginbotham & Lawrence-Dederich (1992) discussed barriers that typically prevented the infusion of technology into the general communication disorders curriculum. The significant obstacles included:

1. The extensive amount of time spent on teaching basic technology skills as opposed to clinically applicable ones.

2. The difficulty for students to reach mastery level performance because of limited in-depth exposure to any specific technology application.

3. The difficulty for students to generalize technology skills acquired in one classroom to other topical areas, clinical practicum, and off-campus settings.

4. The difficulty for clinical supervisors to develop basic technology skills or expertise in specific areas as compared to academic faculty.

5. The difficulty accessing technological equipment necessary for clinical training because most of this equipment was designated for research purposes and kept in laboratories.

6. The difficulty for students to become technologically proficient because off-campus placement settings often did not possess the necessary technologies for them to continue their training.

Chapter III: Anticipated Outcomes and Evaluation Instruments

Goals and Expectations

The goal of this practicum was that preservice speech-language clinicians would use cost-effective and time-efficient methods to analyze language assessment data to design functional treatment programs for children with communicative/linguistic deficits.

Expected Outcomes

The following outcomes were projected for this practicum:

1. A post-implementation technology survey of graduate students enrolled in Language Disorders in Children (LDC) will reveal that 60 out of 75 rated their ability to code the content-form-use of a child's utterances using traditional language sample analysis approaches as good.

2. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 65 out of 75 had experience with a computer-assisted language sample analysis (CALSA) software program.

3. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 60 out of 75 rated their ability to code a child's utterances using a CALSA software program as good.

4. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 60 out of 75 rated their ability to prepare a template using a word processor as good.

5. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 65 out of 75 were familiar with literature addressing ethical

concerns in the use of technology within the field of Speech-Language Pathology (SLP).

6. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 60 out of 75 demonstrated adequate knowledge about areas of ethical concern that could be of major importance to the field, as evidenced by their ability to list more than three relevant comments.

7. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 65 out of 75 were familiar with guidelines suggested by ASHA for evaluating software.

8. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 60 out of 75 demonstrated adequate knowledge about areas to consider when evaluating software for use in the pediatric speech-language assessment-intervention process, as evidenced by their ability to list more than three relevant comments.

9. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 6 out of 8 had experience with a CALSA software program.

10. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 5 out of 8 rated their ability to code a child's utterances using a CALSA software program as good.

11. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 5

out of 8 rated their ability to prepare a template using a word processor as good.

12. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 6 out of 8 were familiar with literature addressing ethical concerns in the use of technology within the field of SLP.

13. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 5 out of 8 demonstrated adequate knowledge about areas of ethical concern that could be of major importance to the field, as evidenced by their ability to list more than three relevant comments.

14. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 6 out of 8 were familiar with guidelines suggested by ASHA for evaluating software.

15. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 5 out of 8 demonstrated adequate knowledge about areas to consider when evaluating software for use in the pediatric assessment-intervention process, as evidenced by their ability to list more than three relevant comments.

16. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 4 out of 8 will discuss topics related to the use of technology with their students as often as possible.

17. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 4 out of 8 will assign research papers and/or projects that incorporate the use of technology into their academic courses and/or clinical labs as often as possible.

Measurement of Outcomes

The writer administered the Post-Implementation Technology Survey: Pediatric Assessment-Intervention (see Appendix B) to graduate students enrolled in LDC in order to measure outcome statements numbered one through eight. This technology survey was also administered to faculty members responsible for supervising/instructing preservice clinicians working with pediatric clients in order to measure outcome statements numbered nine through 17.

Participants were also asked to complete the Self-Evaluation Rating of Technology Skills: Where Are You Now? (see Appendix C) in order to assess their ability in regard to specific technology skills. This survey was administered to graduate students during their first and last technology lab and to faculty members during their first and last technology training workshop. Data obtained from students during their first LDC tech lab and from faculty during their first tech training workshop session served as pre-implementation data in regard to knowledge-base and skill level of participants during the implementation phase of the practicum.

A combination of open- and closed-ended, list, and describe questions were included on the written surveys. The content of these technology surveys included the following topics: (a) experience with CALSA software programs, (b) ability in regard to

using a word processing program to prepare a template, (c) ability in regard to analyzing childrens' utterances in terms of content-form-function using traditional methods and CALSA software, and (d) knowledge concerning ethical issues and software evaluation. Additionally, faculty members were asked to provide information regarding the extent to which they anticipate discussing topics related to the use of technology and assigning research papers/projects incorporating the use of technology into the academic courses and/or clinical labs they teach.

Participants were also asked to complete a program evaluation form at the completion of the implementation phase of this practicum. Graduate student clinicians completed The LDC Technology Lab Evaluation (see Appendix D) and pediatric clinical supervisors completed the Technology Training Workshop Program Evaluation (see Appendix E). These program evaluations were designed in order to provide the writer with information pertaining to the effectiveness of the technology training lab and workshop sessions from the participants' perspective.

Chapter IV: Solution Strategy

Statement of Problem

The problem to be solved in this practicum was that preservice speech-language clinicians were not using cost-effective and time-efficient methods to analyze language sample assessment data to design functional treatment programs for children with communicative/linguistic deficits.

Discussion

Several possible solutions suggested by other professionals interested in the use of cost-effective and time-efficient innovative strategies to prepare students for clinical/educational professional roles were gathered from an extensive review of the literature. Due to the paradigm shift occurring in our society as a result of the information age, which emphasizes a change "from a material- and product-based economy to an information- and service-based economy" (Razik & Nalbone, 1990, p. 66), there is a need to restructure and reform traditional educational curricula, instruction, and service delivery systems to reflect a focus on student learning rather than on activities of educators, particularly those in university settings (McDaniel, 1995; Thornburg, 1992, 1994, 1995). McDaniel (1995) stated that technological advances brought about as a result of the information age have facilitated innovative pedagogical strategies, particularly among higher educators, that have stimulated and encouraged student-oriented learning.

Albright & Graf (1992) discussed the importance for faculty to use technology as an instructional tool for enhancing student learning. These authors stressed that media

technology was an effective resource that provided novel learning experiences for college students within the framework of a well-developed course that had clear learning objectives with instructional methodologies that were designed to meet individual learning styles.

Razik & Nalbone (1990) suggested that higher educators must act as critical change agents by taking a leadership role to restructure universities by infusing innovative technologies into all aspects of the organization's operations. They suggested that universities must adequately train faculty to develop and apply novel information technologies by encouraging and supporting the "reorganization of the professional academic workforce into more differentiated and specialized roles" (p. 71). Jonsen & Johnstone (1991) suggested that institutions of higher education within any state can change their roles from disseminators of knowledge through cooperative and collaborative telecommunications activities with universities throughout other states in order to serve all potential learners.

Hall suggested that a new structural model of the university is needed as a result of new information technologies. He emphasized the necessity for a new "educational credo" (p. 351) which will preserve the most fundamental and critical values inherent in higher academic learning in light of these new organizational structures. Appleberry (1994) discussed his concept of "virtual universities" (p. 4) where institutions of higher education collaborated with others to provide effective systems of instructional delivery by designing learning modules that facilitated critical thinking skills and generated learning outcomes. He emphasized the importance for higher educators to recognize and

use innovative technologies as a mechanism for academic service delivery instead of allowing technological advances to dictate and control members of society.

It is important to recognize, be sensitive to, and address factors regarding individual attitudes about using computer technology. Larson & Whiteside (1986) suggested the use of the Stages of Concern Questionnaire (SoCQ) (Hall, George, & Rutherford, 1979) to determine the concerns of preservice clinicians in regard to using computers. The SoCQ is a tool designed to assess an individual's concern about any innovation. This 35 item Likert-scale measure consists of seven subscales coinciding with levels of concern that include awareness, informational, personal, management, consequence, collaboration, and refocusing. The authors stated that this instrument provided valuable information to faculty regarding integrating technology into their communication sciences and disorders training program. The data provided a framework for developing workshops and providing hands-on training opportunities that met the need of graduate student clinicians.

McFarlane (1990) stressed the importance for clinicians to realize that traditional training in regard to theoretical information, the clinical process, and client management issues is not obsolete due to the emergence of microcomputer technology within the profession of Speech-Language Pathology. He averred that technological advances can only serve to make a competent and skilled clinician more efficient.

Pentz (1987) suggested that an orientation to computers and hands-on technology training can reduce computer anxiety and worry in regard to job security among professionals. He discussed that components of a good training program to ensure that

technology is successfully integrated into the work setting should include the following:

1. A required attendance schedule for all employees that is built-in as part of their work-day or work-week.

2. An organized agenda that includes a time-table and a specific action plan with comprehensive objectives that should be developed by the employer.

3. An initial discussion in regard to organizational changes that specifically addresses issues concerning employment longevity.

4. A series of workshops designed to facilitate an understanding of basic computer terminology, information and operations, with emphasis on specific job-related applications.

5. A series of hands-on training sessions that incorporates the use, evaluation, and maintenance of hardware and software, with expanded opportunities for practice.

6. A user-group approach to and opportunities for mutual problem solving, practice, and mastery of the newly learned technology skills. The author stressed the importance for flexible work schedules to allow for practice time.

7. The provision for continued training opportunities beyond the level for advanced skill development and skill enhancement.

8. A plan to address personnel changes and the training of new employees.

Faculty members in training programs for Communication Sciences and Disorders must respond to educational and social changes by facilitating the use of innovative, cost-effective, and time-efficient strategies in the academic and clinical

preparation of graduate student clinicians. Goldsmith, Fagan, & Battle (1994) called for a "blueprint for a new academic agenda" (p. 47) at the ASHA Colloquy. Ferraro (1994) and Flahive (1994) suggested the use of interactive technologies as a strategy for enhancing faculty development and improving instruction. Guilford (1994) urged that academic and clinical preparation programs in Speech-Language Pathology and Audiology must adopt distance-learning technologies, recruit faculty who have expertise in telecommunications, and engage in the use of these innovative, cost-effective, and time-efficient technologies by developing cooperative partnerships with institutions of higher education within state university systems.

Chial (1986a) discussed objectives that could be obtained by integrating computer technology into preservice academic and clinical preparation programs in Communication Sciences and Disorders. Additionally, he designed a strategic plan for obtaining and maintaining computer facilities. Important aspects of the strategic plan included the following:

1. The level of technological skill the academic program desires its faculty and students to achieve.

2. An evaluation plan which identifies criteria for achievement and assesses overall effectiveness.

3. Operational goals that are not only efficient, but that are also driven by educational goals that facilitate the development and enhancement of students' intellectual capacities.

Also discussed were five broad objectives that could be achieved by professionals using

technology for professional intentions. These included "affective gain, performance gain, behavior gain, information gain, and cognitive gain" (Chial, 1986a, p. 37).

Cooper & Gelatt (1985) served as Project Director and Project Administrator respectively, for the Leadership Training in Computer Technology Project sponsored by ASHA. The project was designed to facilitate the integration of computer technology into the graduate level and doctoral level curricula of academic and clinical training programs in Communication Sciences and Disorders and related fields. The broad goal of the project was to accomplish the following objectives:

1. To enhance faculty development, with particular emphasis on program administrators and researchers, in regard to utilization of microcomputer technology.

2. To infuse the uses of computer technology into graduate level and post-graduate level curricula.

3. To promote opportunities for continual learning in regard to the uses of computer technology and keeping abreast of technological advances.

These experiences were also directed towards speech-language clinicians and special educators on a preservice level to facilitate computer technology training across disciplines. Future professionals working with children who exhibit communicative/linguistic deficits, therefore, would have a broad knowledge-base of computers and understand basic application of technology skills.

Preservice and professional speech-language clinicians must be educated in regard to the impact of ethical issues upon uses of microcomputer technology in the field of Speech-Language Pathology. Academicians who are responsible for training

undergraduate and graduate students to enter the speech-language-hearing clinical/educational profession have an ethical responsibility to teach their students about the uses of microcomputers and the ethical issues that impact upon the areas of assessment, intervention, decision-making, research, clinical record keeping, augmentative-alternative communication, and computer-assisted instruction (Cooper et al., 1985; Ford, 1993; Zangari & Newby, 1991). With this training, graduate students would be able to enter the workforce with the advantages of technological skills. They, therefore, might be better equipped to ensure that children with special needs have access to microcomputers and software that may facilitate communication development and enhance their linguistic skills. Parette, Hourcade, & VanBiervliet (1993) stated that educators must be knowledgeable in regard to ethical concerns in order to carefully analyze the characteristics of their students and specific technologies before determining appropriate software and before selecting particular microprocessors for use with children with special needs.

ASHA has clearly delineated codes of conduct which protect the highest standards of integrity and ethical principles crucial in executing the professional responsibilities of all speech-language pathologists and audiologists and forms the basis for the profession's Code of Ethics (ASHA, 1992). If one abides by ASHA'S ethical standards, it becomes apparent how potential conflict can arise between these principles and how some professionals might employ the use of computer technology within the field. It is particularly necessary, therefore, for individuals who employ the use of technologies to be especially knowledge about these ethical issues.

Wynne & Hurst (1995) suggested that school administrators should develop polices that address software copyright and licensed use, information access and the right to privacy, computer-assisted or computer-administed assessment and intervention, and documentation as the infusion of computers increases and becomes more important in educational workplaces. School-based clinicians would, therefore, be more knowledgeable and have a resource guide to help them understand the impact of these ethical and legal issues as they relate to the use of technology in educational settings. These authors provided information concerning the ethical and legal implications of using technology, so that school personnel, particularly speech-language pathologists and audiologists, would be more cognizant of these issues.

To minimize the risks of unauthorized access and use, and to protect individuals rights to privacy, security measures and communication safeguards (e.g., remembered information, log-on codes, user ID codes, passwords, dialog authentication, possessed objects, personal identification numbers, biometric devices, and callback systems) have been suggested (Shelly, Cashman, Waggoner, & Waggoner, 1995). To reduce the risk of information theft and software piracy, these authors suggested the use of encryption and network versions of software packages for organizations with a large number of employees who use the same software programs. Ford (1993) suggested that ethical standards and professional guidelines be developed for users, developers, publishers, and distributors of computer-assisted clinical software.

Appropriate training regarding the uses of microcomputer technology must be provided to professional speech-language pathologists and preservice clinicians, with

emphasis on addressing factors as to why they are resistant to using computer technology with their clients. In regard to assessment and intervention, computers can be used with a variety of clinical populations to obtain case history information, administer tests, score and analyze clients' responses to test items, analyze speech-language samples, display or report test results, and control intra- and inter-clinician variability in standardized procedures and protocols in a time-efficient and cost-effective manner (Howard, 1986b; Larson & Steiner, 1988; Silverman, 1987; Zangari & Newby, 1991).

Silverman (1987) discussed applications related to goal-setting, preparing therapy materials, report writing, and evaluating therapy outcomes, which have been designed to assist clinicians to expedite the intervention process more efficiently. Microcomputer applications to the intervention process can be classified according to the various types of instructional activities in which clients can participate and/or conduct. These included drill and practice, simulation, tutorial, instructional games, problem-solving, and exploration and discovery (Larson & Steiner, 1988; Russell, Corwin, Mokros, & Kapisovsky, 1989; Silverman, 1987). Cochran & Bull (1993) discussed various uses of computers during the clinical process and specific types of software applications for use with individuals who have speech-language and communication deficits.

The majority of computer-assisted assessment and intervention software programs, which can be categorized as either clinician-oriented or clinician-independent applications, have been designed to evaluate and remediate language and articulation-phonological disorders in children and adults (Larson & Steiner, 1988; Silverman, 1987). Lepper (1985) suggested that technology should only be used to promote a social context

for learning. Miller & Marriner (1986) adopted this philosophy and proposed a paradigm shift in the use of computers for pediatric language intervention purposes. These authors suggested that good language intervention software should create a learning context that warrants clinician-child interaction in regard to the specific content of the program.

Numerous clinicians, researchers, and authors stressed the importance of language sample analysis procedures in the pediatric assessment-intervention process (Fox & Wilson, 1986; Long, 1991; Long & Masterson, 1993; Miller & Lyngaas, 1995; Schwartz, 1985). Wilson & Fox (1986) and Long (1991) emphasized that computer-assisted language sample analysis (CALSA) software must convey the relationship between language function (pragmatics), structure (phonology, lexicon, syntax, discourse, semantics) and content (cognition) if the program is worthwhile. Several clinician-researchers have authored CALSA software programs that meet this criteria to varying degrees (Long & Fey, 1993; Miller & Chapman, 1993; Pye, 1987; Weiner, 1995).

Long (1991) discussed the benefits of using CALSA in regard to data analysis and interpretation. He emphasized, however, that because language sample analysis is a critical procedure in the development of functional treatment programs, it's a complex process in which the clinician must consider many pieces of information and evaluate them from several perspectives before an accurate interpretation can be made. The author, therefore, suggested that CALSA can only be used effectively and efficiently when speech-language clinicians are given the following:

1. Ample time to learn the particular software program's analysis features.

2. Ample time to demonstrate competency with the operation of the program.

3. Ample time to learn the operation of the particular microcomputer on which the CALSA program runs.

Long & Masterson (1993) discussed the advantages and disadvantages of using CALSA software. The importance of entering language sample data consistent with the software program's linguistic and phonological framework in order to minimize the risk of transcript analysis errors was emphasized. The authors stated that the information obtained from CALSA can greatly enhance speech-language clinicians' abilities to determine clients' patterns of communicative/linguistic strengths and weaknesses, thereby, facilitating decision-making in regard to the intervention process. They averred, however, that it is the speech-language pathologist who bears the responsibility of making accurate interpretive judgements from computer generated data, that does not guarantee flawless information.

Miller & Lyngaas (1995) collaborated on a project that involved designing and instituting training workshops and six transcription laboratories using Systematic Analysis of Language Transcripts (SALT), a CALSA program authored by Miller & Chapman (1993). This collaborative effort between a researcher and a public school clinician "helped create a model diagnostic program for children with language disabilities" (Miller & Lyngaas, 1995, p. 47). It provided hands-on training and equal access to computer technology for speech-language clinicians in an entire public school district, according to the authors. They attested to the desirable outcomes of this project

in that school clinicians learned the benefits of CALSA, without the time-consuming task of manual transcription of language sample data. This served to heighten their enthusiasm for the procedure, thus increasing the frequency with which language sample analysis procedures were conducted.

Schwartz (1985) discussed the clinical, instructional, and research benefits of using CALSA software. Schwartz (1985, 1989) also stressed that CALSA software provided speech-language clinicians with a variety of analyses and a measure of flexibility in that they processed data more rapidly and accurately than any existing traditional manual procedure. Schwartz (1989) predicted that the type of CALSA software expected to emerge throughout the 1990's will reflect smart software. He explained that smart software will organize data that the user inputs and then provide suggestions to guide/direct the user in regard to choices or alternative actions to pursue. The author also suggested that CALSA software that recognizes speech will significantly aid clinicians with the language analysis process.

In regard to administrative issues, microcomputer technology can be used to facilitate personal productivity. Larson & Steiner (1988), Silverman (1987), Sarachan-Deily (1990), and Zangari &Newby (1991) discussed ways to control information by using word processing, database management, spreadsheets, and desktop publishing systems to maintain client records, record client progress notes, generate individualized education programs, write clinical/educational reports, analyze clinical populations, and evaluate student-clinicians' performances.

In regard to augmentative and alternative communication (AAC), microcomputer technology can be used to provide or enhance the communication of individuals with minimal or no functional speech. Fried-Oken (1989) and Silverman (1987) discussed microcomputer-based communication, such as systems that generate synthesized speech or printed messages, technological devices that improve voice input/output, and the use of artificial intelligence to facilitate the speed of speech rates. Peripheral devices, such as disk drives, video monitors, printers, keyboards, and joysticks, designed to augment communication were also discussed.

Computer technology can also be used to facilitate decision-making in regard to various aspects of the clinical process. Silverman (1987) and Zangari & Newby (1991) discussed ways in which computer programs can assist clinicians in making decisions concerning differential diagnosis, the etiology of clients' communication disorders, the prognosis for clients' improvement, and recommendations for intervention goals and objectives.

Microcomputer technology has made the laborious tasks of conducting clinical research much more practical and achievable because computers can categorize, sort, and analyze vast amounts of data much more quickly and accurately as compared to traditional manual mathematical computations. Larson & Steiner (1988), Silverman (1987), and Zangari & Newby (1991) suggested that complex statistical analyses, maintaining a database of caseload information about specific clinical populations, control of stimulus presentation, control of instrumentation, literature searches, and generating research reports can all be accomplished through various software programs.

Speech-language clinicians must receive specific training in regard to evaluating hardware and software so that they can make appropriate selections when incorporating technology into the clinical process (Cochran & Masterson, 1995; Fox, 1990; Larson & Steiner, 1988; Schwartz, 1985). Greyerbiehl, Schwartz, Clymer, Owens, & Blackstone (1986) have proposed guidelines for reviewing and evaluating software. Hesser & Mizell (1993) designed matrices that assist the potential buyer in comparing specifications among brands of computers, monitors, printers, and assistive devices.

Chial (1984) discussed strategies and principles to consider when evaluating computer hardware systems. He emphasized that the function, capacity, speed flexibility, expandability, portability, cost, reliability, and service coupled with the compatibility with software, operator, and additional hardware were important factors to consider before making any system purchases.

Chial (1986b) discussed strategies and principles to consider when evaluating software. He discussed an evaluation model that involved three specific goals which included:

1. Understanding similarities and differences among software programs designed to achieve comparable outcomes.
2. Identifying strengths and weaknesses of specific applications.
3. Facilitating decisions in regard to costs and benefits of particular programs.

He also presented an evaluation strategy that involved a systematic process emphasizing the identification, description, and assessment of the quality of the software product

under consideration. The author concluded by offering specific suggestions for the evaluation process. He stressed the particular importance of considering the needs of potential uses, a description of the product, and the assessment of the documentation, ease of learning, ease of use, and professional context (e.g., assessment, intervention, patient record management, financial management, program administration, AAC, instructional, or research).

Taber-Brown (1993) suggested software evaluation guidelines and provided a list of education software sources for clinicians and educators working with children and youth who have special needs. Cheek & Kelly (1993) proposed a comprehensive program evaluation model for assessing specific computer applications for use with exceptional learners. They suggested that "program planning, monitoring program implementation, assessing outcome, [and] analyzing cost-benefit and cost-effectiveness" (p. 317) should be considered.

Clinicians must be educated in regard to available funding sources for microcomputer technology. Glasky (1984) proposed guidelines for individuals and organizations interested in integrating microcomputer technology into their operations. He discussed a model for preparing research, curriculum, equipment, network or consortium, and special project proposals. The author also provided a resource list of funding sources for the various types of proposals described. Schwartz (1990) and Wynne (1991) suggested seeking outside funding sources to support the integration of computer technology for clinical training and instructional purposes in graduate education/clinical preparation programs.

Masterson (1995) stated that as of 1991 members of the Program Committee for ASHA's annual conference have established a track for microcomputer presentations and hands-on instructional technology lab sessions in an attempt to resolve the need for professional training opportunities. Cochran & Masterson (1995) strongly suggested that clinicians should investigate applications that utilize technology as "a context for conversation, a tool for learning, a tool for linguistic and phonological analysis, a tool for treatment data collection, a treatment materials generator, and a biofeedback device" (p. 213) in order to resolve their skepticism in regard to the efficacy of technology as well as to overcome other factors that hinder their use of computers. These authors averred that the only way for clinicians to resolve their concerns in regard to time spent on computer tasks is to use technology with their clients and evaluate the outcomes with specific individuals. Cochran & Masterson (1995) stressed that clinicians must learn to strike a balance between their need and the child's desire to be in command of the computer. They suggested shared control to ensure optimal use of time. Furthermore, these authors emphasized that communicative interactions focus on the treatment objectives. Additionally, Cochran & Masterson (1995) stated that in regard to efficacy of computer-assisted instruction (CAI), "no experimental results have shown that children with speech or language disorders significant enough to be considered educationally handicapping improve their ability to communicate with other people merely as a result of independent use of CAI" (p. 215).

Ferguson (1993) suggested that in regard to using computers as a learning tool, school-based clinicians, who generally teach language from a process approach that

integrates thinking, listening, speaking, and writing simultaneously within meaningful contexts, consider incorporating technology within the four stages of teaching language. Ideas to integrate technology within fluency, form and correctness, and publishing phases of the language process were offered. A list of educational software companies was also provided.

Ferguson (1993) also suggested that clinicians need to investigate ways to gain access to computers within their specific workplaces. He suggested several noteworthy ideas that included:

1. Pre-scheduling times to borrow a computer and/or use the school's computer lab (provided that there is one in the building).

2. Team teaching and collaborative learning activities with teachers who have computers in their classrooms and who will allow clinicians to use then with their students.

3. Persuading school administrators to purchase a computer for their classroom.

4. Exploring options for external funding sources to purchase a computer system and software packages for their classrooms.

Graduate education/clinical preparation programs in speech-language Pathology and Audiology need to develop curricula that emphasizes the application of microcomputer technology as it relates to the clinical process (Wynne, 1991). Wilson (1994) encouraged higher educators to respond to and utilize innovative technologies to prepare students for the rapidly changing global world which people in our society have

inherited. Barker (1993) discussed the importance for colleges and universities that offer teacher education training programs to prepare new teachers with the necessary skills to understand and utilize current and innovative technologies within critical thinking strategies. Learning activities that will stimulate and maintain student interest as well as prepare children and youth for the information-communication age in which they will live were also stressed as important factors in the preparation of preservice educators. Hughes, Lehman, Scukanec, & Tatchell (1993) and Zangari & Newby (1991) discussed various types of microcomputer technology that could be incorporated into the academic/educational curricula.

Several authors discussed strategies for integrating technologies into the graduate level curricula of speech-language clinical training programs. Higginbotham & Lawrence-Dederich (1992) discussed strategies used to integrate technology into their communication disorders program by means of major curricular revision. They stated that faculty were infusing technology into the curriculum in courses that traditionally have not focused on using technology. In Language Disorders in Children, for example, graduate students were now required to perform CALSA for project-related assignments. This technology was also being used more for in-class demonstrations and for clinical training. The authors also suggested that academic and clinical faculty investigate options for obtaining external grants to support the development of specialized training modules (e.g., an AAC track). Additionally, it was suggested that undergraduate programs must take the responsibility for teaching basic technology skills so that

graduate level faculty can focus on facilitating mastery level performance in advanced and specialized technologies.

Seaton, Richards, & Harter (1985) discussed strategies to facilitate faculty acceptance of and desire to use microcomputer technology. These strategies included:

1. Designating an individual or individuals within the university who can serve as technology resource personnel.

2. Organizing a university-wide computer action committee that ensured faculty representation and involvement from members of specific academic disciplines.

3. Attending outside training seminars that provided hands-on training experiences and opportunities to learn about instructional approaches in regard to teaching specific technological applications.

4. Demonstrating the personal and professional benefits of using computer technology to individual faculty members.

5. Establishing specific user groups to develop expertise with particular software applications and to provide future training to others.

6. Ensuring equal access and availability of computers of all faculty members.

7. Defining present and future program and individual faculty needs, which the authors suggested may require making an initial hardware and/or software investment so that novice users could acquire basic technology competencies and adequate experience to determine these needs.

Kirschmar (1990) designed a course and wrote a manual in order to develop and enhance the library search skills of students enrolled in speech-language and hearing courses through the use of computer technology. The author's syllabus emphasized the types of available databases, procedures for accessing and searching these databases, and computer retrieval methods to obtain references to publications related to a plethora of speech-language and hearing topics.

In regard to preservice and professional education, there is a growing market for the use of academic computer-assisted instruction (CAI) to teach undergraduate and graduate level courses within the communication sciences and disorders curriculum, according to Silverman (1987) and Zangari & Newby (1991). The interactive capabilities of microcomputers and computer information networks (e.g., the Internet) have allowed academicians and professional clinicians to facilitate their own continual learning and exchange information/ideas about new assessment and intervention strategies/methodologies through the use of electronic bulletin boards and on-line discussion groups in a reasonably accessible, flexible, and cost-effective fashion (Cochran & Bull, 1992; Larson & Steiner, 1988; Silverman, 1987).

Bermejo (1985) and Cochran & Bull (1992) discussed the various types of CAI (e.g., drill and practice, tutorial, inquiry, simulation, and hypermedia) and highlighted the advantages and limitations of each form. Bermejo (1985) suggested that the development and utilization of CAI in clinical/educational training programs may be a suitable alternative instructional strategy to help resolve some of the problematic issues facing higher educators today.

Cochran & Bull (1992) distinguished between two types of computer applications to facilitate instruction and individual learning. They explained that traditional CAI involved programmed instruction in which the computer assumed the role of the instructor, or functioned as an adjunct with the instructor, such that a pre-determined set of exact instructional objectives were conveyed. Computer-based tools, on the other hand, were learner-directed and were designed to assist the user in completing tasks that often has a range of possible outcomes. The learner, therefore, must not only be familiar with using the computer, but have a previously acquired knowledge-base in the particular subject matter. The authors pointed out that instructors must be aware of the product generated from a computer-based tool when assigning projects to students, so that their level of achievement can be evaluated by the product presented. Cochran & Bull (1992) encouraged the integration of computer-based tools into the communication sciences and disorders curriculum. Generic computer-based tools include statistical packages and database/spreadsheet software, for example, whereas, specialized tools include CALSA software and voice analysis systems. The authros suggested that CAI is a cost-effective measure for higher educators to meet the demands of training preservice clinicians.

Cochran (1989) averred that communication disorders specialists, whether professional or preservice clinicians, academicians, and/or researchers, must become computer competent in addition to being computer literate. Cochran (1989) and Cochran & Bull (1992) stated that the emphasis on instruction in speech-language pathology and audiology clinical preparation programs should be on the clinical application of computers and not on computers themselves.

Cochran (1989) professed a "philosophy of clinical computing" (p. 111). The author recommended that in order to create a culture conducive to the clinical application of computers, faculty should employ strategies that facilitate a nurturing enviornment in which students, academic instructors, and clinical supervisors could develop and enhance technology and clinical skills through mutually supportive efforts. Cochran (1989) and Cochran & Bull (1992) encouraged the use of telecommunications as an instructional methodology and as a means of providing graduate students and faculty with professional support.

Wynne (1991) developed a model of computer competencies necessary for all speech-language pathologists and audiologists to demonstrate computer literacy as technology continues to assume a critical role in program administration and clinical service delivery. Cochran et al. (1993) developed a model of clinical computer-based competencies for speech-language clinicians, which the authors stated were also applicable to audiologists. The objectives reflect computer-based competencies in two broad domains that included:

1. Areas related to program administration and development (e.g., productivity, ethics, related resources, and basic operations).

2. Areas related to speech-languge service delivery (e.g., diagnostics, context for conversation, CAI, clinical data recorder/analyzer, biofeedback device, and personalized clinical and therapy materials generator).

Specific skills in regard to each broad objective must be developed on an individual basis in accordance with what technological resources are available at local levels, although

the authors provided numerous suggestions and ideas. The authors also recommended that these broad goals could be used as a guide for curricula revisions, to purchase computer systems and generic as well as specialized software applications, and to plan continuing education opportunities and hands-on training experiences as new technologies continue to emerge.

Based upon the extensive review of the professional literature, the writer concluded that there was a need to integrate content areas addressing technology-based clincial skills into the graduate level education/clinical preparation curricula. The writer generated the following ideas, as a result of the literature review.

The writer strongly believed that academic faculty and clinical supervisors, who were employed in university Speech-Language Pathology and Audiology programs and who were responsible for teaching preservice clinicians, have an ethical responsibility to their profession and to their students to prepare these future professionals with the basic computer knowledge/skills and computer-based clinical competencies as they relate to the clinical process. This idea was generated from the work of Cochran (1989), Cochran & Bull (1992), Howard (1986b), Hughes, Lehman, Scukanec, & Tatchell (1993), Larson & Steiner (1988), Silverman (1987), and Zangari & Newby (1991).

In order for preservice clinicians to be more efficient and effective when working with children and youth who have special needs, there was a need to incorporate technology into the curriculum that focused upon theoretical information and practical educational/clincial application of theoretical principles pertaining to the pediatric speech-language assessment-intervention process, particularly in the following areas:

1. The uses of microcomputer technology with pediatric clinical populations and the specific types of available educational software, based upon the work of Cochran & Bull (1993), Long (1991), Larson & Steiner (1988), and Schwartz (1985).

2. The benefits of using CLASA procedures, based upon the work of Fox & Wilson (1986), Long (1991), Long & Masterson (1993), Miller & Lyngaas (1995), and Schwartz (1985).

3. Experiences with CALSA software applications, based upon the work of Long & Fey (1993), Miller & Chapman (1993), Pye (1987), and Weiner (1995).

4. Software and hardware evaluation strategies, based upon the work of Greyerbiehl, Schwartz, Clymer, Owens, & Blackstone (1986) and Chial (1984, 1986).

5. The impact of ethical issues, based upon the work of ASHA (1992), Ford (1993), Shelly, Cashman, Waggoner, & Waggoner (1995), and Wynne & Hurst (1995).

6. The advantages of using basic software applications (e.g., word processing, database management, and spreadsheets) and telecommuniations (e.g., e-mail, the Internet), based upon the work of Cochran & Bull (1992, 1993), Kuster (1996a, 1996b), and Shelly, Cashman, Waggoner, & Waggoner (1995).

7. The forms of CAI and the advantages and limitations of each type of CAI in regard to therapeutic intervention, based upon the work of Bermejo (1985), Cochran & Bull (1992), Cochran & Masterson (1995), and Ferguson (1993).

There was also a need to provide faculty members responsible for instructing/supervising preservice clinicians working with pediatric clients with knowledge, skills, and hands-on trainng experiences in regard to the above mentioned

technology-related content areas. The writer's ideas for accomplishing this included:

1. Implementing the strategies suggested by Chial (1986a) in regard to strategic planning.

2. Developing and implementing technology-based clincial competencies in collaboration with other faculty members, based upon the work of Cochran et al. (1993).

3. Implementing strategies suggested by Pentz (1987) in regard to designing professional hands-on training workshops.

4. Employing strategies suggested by Seaton, Richards, & Harter (1985) in regard to facilitating faculty buy-in to the acceptance and use of computer technology.

5. Familiarizing faculty with CAI instructional methodologies, based upon the work of Bermejo (1985) and Cochran & Bull (1992).

Each of these general solution strategies could be implemented into the writer's work setting in a timely, cost-effective manner. Graduate strudents' plans of study could be discussed with the Academic Advisor. Clinical supervisors' schedules could be discussed and arranged with the Clinic Coordinator to ensure flexibility so that they could attend technology-based clinical skills training workshops. CALSA software applications could be purchased with monies alloted in the budget for ongoing program and curriculum development. The writer's teaching schedule could be discussed and arranged with the Associate Director for Academic Curriculum. As a speech-language pathologist and clincial educator, the writer's areas of expertise were in pediatric communication/linguistic developement and disorders, the provision of transdisciplinary early intervention services, and clinical supervision. Furthermore, the writer has

developed a strong interest and competencies in educational technology as a result of doctoral studies. The writer could, therefore, serve as the sole faculty member responsible for addressing current, pertinent issues in regard to the uses of microcomputer technology in the pediatric assessment-intervetnion clinical process, particularly in regard to CALSA applications, with preservice clinicians and faculty.

Description of Selected Solutions

The writer planned to implement the above mentioned ideas and strategies during the implementation phase of the practicum because they constituted best-practice in regard to current trends to incorporate computer technology into the academic and clinical curricula of professional preparation programs in Communication Sciences and Disorders. In response to the needs of the profession and the demands of the marketplace, the writer planned to implement the following solution strategies, as a result of the literature review:

1. During the implementation phase of this practicum, the writer planned to design and implement a technology-based clinical skills curriculum, based upon the works of the previously mentioned authors, that included the following topics:

    1. The uses of microcomputer technology in the pediatric languge assessment-intervention clinical process.

    2. An overview of common operating systems (e.g., windows and MS-DOS).

    3. An overview of basic computer applications (e.g., word processing, databases, spreadsheets, and telecommunications).

4. An overview of CALSA software applications.

5. Strategies and principles to consider when evaluating hardware and software.

6. The impact of ethical issues on the use of microcomputer technology in pediatric speech-language pathology.

7. An overview of CAI and educational software resources.

2. During the implementation phase of this practicum, the writer planned to develop and implement a required technology lab course to be taught in conjunction with the graduate level couse in Language Disorders in Children (LDC). The writer intended to employ the necessary leadership skills when meeting with members of the Curriculum Committee and Administrative Council to propose that a 1 ½ hour tech lab be added to each section of LDC per semester. The writer also planned to teach all sections of the tech lab and intended to suggest that this be done as a collaborative effort with the instructor(s) of other LDC academic course sections. The writer planned to implement the proposed technology curriculum through discussions, demonstrations, and hands-on experiences during lab class meetings and through independent small-group assignments.

3. During the implementation phase of this practicum, the writer planned to develop and implement a series of hands-on technology-based clinical skills training workshops for faculty responsible for instructing/supervising preservice clinicains working with pediatric clients. Other interested faculty or staff members who wished to participate would also be welcomed. The writer planned to coordinate flexible scheduling with Clinic Coordinator to ensure that faculty could attend the technology

training sessions. The writer intended to suggest that one of the two monthly supervior meetings, which generally last approximately 1 ½ to 2 hours be dedicated to technology training. Topics to be covered included those mentioned in the proposed technology lab curriculum for LDC.

4. During the implementation phase of this practicum, the writer planned to collaborate with faculty/staff at the microcomputer lab on campus to conduct the LDC tech labs and faculty tech training workshops at their facility. The writer also intended to coordinate the purchase and installation of CLASA software with the microcomputer lab personnel. The writer was also prepared to assist in obtaining the necessary licensure agreements in whatever manner was deemed appropriate.

5. During the implementation phase of this practicum, the writer planned to provide both graduate student enrolled in all sections of LDC and faculty members participating in the tech training workshops with hands-on experience using CALSA software applications. The specific CALSA software programs intended for use would be either the Systematic Analysis of Language Transcripts (SALT) (Miller & Chapman, 1993) or the Parrot Easy Language Sample Analysis Plus (PELSA Plus) (Weiner, 1995). These programs were selected because they generate information that allows the user to interrelate the content (semantic)-form (morphology, phonology, grammar, syntax)-function (use/purpose) components of languge, as suggested by Wilson & Fox (1986) and Long (1991). The SALT (Miller & Chapman, 1993) application, however, generates much more comprehensive and detailed information and requires significantly more complex coding conventions as compared to the PESLA Plus (Weiner, 1995) software

program. The CALSA application chosen would be determined by the writer based upon results of the Self-Evaluation Rating of Technology Skills: Where Are You Now? (see Appendix C). This survey was intended to be administered to all participants at the initial meeting of the LDC tech labs for graduate students and the technology-based clinical skills training workshops for faculty. The self-rating scale was developed by the writer to determine the level at which participants felt they were at in regard to technology-based applied clinical skills and knowledge in the pediatric language assessment-intervention process.

Report of Action Taken

The implementation phase of this practicum occurred during the Spring-Summer 1996 semester, which began in May and ended in August, and the Fall 1996 semester, which began in September and ended in December. Fifty-six graduate students enrolled in LDC and eight faculty members who were responsible for instructing/supervising preservice clinicians who worked with children and youth who had communicative/linguistic deficits participated in this practicum.

The writer designed a technology curriculum which was compatible with topical areas covered in the LDC course. The writer taught all sections of the LDC tech lab course in which this curriculum was implemented. The LDC tech lab was a required component of the LDC course. Students attended the LDC tech lab for 1 ½ hours of facilitative, hands-on instruction weekly. Students were encouraged to practice on their own to master the expected technology-based clinical skills, particularly in regard to CALSA. The following topics were discussed and/or demonstrated in the LDC tech lab

during the eight month implementation phase of the practicum:

1. The uses of microcomputer technology in the pediatric language assessment-intervention process. Students were expected to prepare an abstract of the article entitled "Microcomputer Use in Assessment and Intervention with Speech and Language Disorders" by Larson & Steiner (1988).

2. An overview of common operating systems (e.g., Windows, MS-DOS, Apple/Macintosh).

3. An overview of basic software applications (e.g., word processing, databases, spreadsheets, and telecommunications) and their uses in pediatric clinical management.

4. An overview of the advantages and disadvantages of CALSA software applications and discussion of the CALSA project. Students were expected to prepare an abstract of the article entitled "Computer Technology: Uses in Language Sample Analysis" by Long & Masterson (1993).

5. Hands-on practice with SALT (Miller & Chapman, 1993). Students were expected to complete the SALT tutorial following demonstration and review of the program manual. Two training sessions were provided for practice and completion of the SALT tutorial.

6. Hands-on training with SALT (Miller & Chapman, 1993). There were six hands-on training sessions using this CALSA application provided. Students were given language samples of children exhibiting various communicative/linguistic disorders.

They were taught to input, code, and analyze utterances from the practice samples provided.

7. Developing functional treatment goals and objectives for pediatric clients with communication/language deficits based upon CALSA generated information using SALT (Miller & Chapman. 1993). Students were taught to formulate a descriptive clinical impression regarding the nature of the child's communication/language problem(s) and develop a functional treatment program, including appropriate therapy goals and objectives and treatment methodologies, from the computer-generated information. These practice/training sessions provided the fundamental knowledge and skills necessary for students to complete their CALSA project. The language sample provided for the independent project was of comparable length and complexity as the ones provided during the practice sessions.

8. An overview of PELSA Plus (Weiner, 1995).

9. Strategies for evaluating hardware and software.

10. Ethical considerations in the use of microcomputer technology within the field of Speech-Language Pathology, with emphasis on pediatric populations. Students were expected to prepare an abstract of the article entitled "Legal Issues and Computer Use by School-Based Audiologists and Speech-Language Pathologists" by Wynne & Hurst (1995).

12. Developing templates for clinical report writing.

13. An overview of CAI and educational software resources.

14. An introduction to telecommunications as it relates to the pediatric language assessment-intervention process.

The practicum was implemented with two groups of graduate students. The first group consisted of 30 participants during the Spring-Summer 1996 semester (May-August), hereafter referred to as the Semester 1 group. The second group consisted of 26 participants during the Fall 1996 semester (September-December), hereafter referred to as the Semester 2 group.

Students in the Semester 1 and 2 groups were asked to complete the Self-Evaluation Rating of Technology Skills: Where Are You Now? (see Appendix C). This measure was used to determine the level at which participants felt they were beginning in regard to technology knowledge, applied skill, and attitude. The writer also used the information obtained from this survey for two purposes. First, it assisted the writer in determining that SALT (Miller & Chapman, 1993) was the most appropriate CALSA application to formally teach to students and that an overview of the PELSA Plus (Weiner, 1995) was sufficient. This decision was made after careful consideration of the participants' skill and comfort level with computer technology. The writer felt this was an important issue to consider because the SALT (Miller & Chapman, 1993) application is much more complex to learn, however, in the writer's opinion, it generates much more in-depth analyses of data. This information is pertinent in order for clinicians to develop comprehensive, functional treatment programs. Second, it served as a basis of comparison (pre- and post-implementation data) from which increased

knowledge and improved skill levels in regard to technology-based clinical skills, emphasized during the tech labs, could be determined.

Students in the Semester 1 group were also asked to complete the LDC Technology Lab Evaluation (see Appendix D). The information obtained from this formative measure allowed the writer to determine the level of effectiveness of the LDC tech labs and decide it any modifications to the technology curriculum were warranted, based upon students' feedback.

Of the 30 participants in the Semester 1 group, 16 indicated in the comment section on their LDC Tech Lab Evaluation that they would have preferred if the six hands-on practice sessions using SALT (Miller & Chapman, 1993) were used to work on their independent CALSA project, a required assignment for the LDC course. These practice sessions were incorporated into the LDC Tech Lab curriculum to provide students with ample opportunities to practice the SALT application and receive feedback from the writer who also served as the tech lab instructor. From the writer's perspective, who serves as a clinical educator in a higher academic setting, it seemed inappropriate for students to work on a required course assignment during class time. The writer strongly believed that the tech lab instructor's role and responsibility was to provide students with facilitative instruction to develop/enhance skills necessary to complete their language sample analysis project. It was not unreasonable to expect that generalization of these clinically-based technology skills should occur during the course of one semester, at least to some degree. The writer felt, however, that after teaching this new tech curriculum for the first time the following modification should be made in

response to students' feedback. Instead of having unstructured practice sessions in which students worked independently at their own pace on inputting, coding, and interpreting computer-generated analyses using SALT (Miller & Chapman, 1993), as the instructor attempted to provide participants with one-on-one feedback based upon their needs, the practice sessions needed to be conducted in a more structured fashion.

During the second half of the implementation phase of this practicum, the SALT (Miller & Chapman., 1993) practice sessions in which students in the Semester 2 group participated were conducted with the writer leading the group. Specific instructions were given as to the type of CALSA skills that students were expected to practice during each tech lab class. Additionally, students were required to submit their work on a weekly basis so that the instructor could provide written as opposed to only verbal feedback on their performance. Comments received on the LDC Tech Lab Evaluation form from students in the Semester 2 group were much more positive in regard to how the practice sessions using the SALT (Miler & Chapman, 1993) application were conducted following this modification to the curriculum. No further modifications in regard to the curriculum were warranted, based upon information obtained from the students in the Semester 2 group.

The writer also developed and implemented a series of hands on technology-based clinical skills training workshops for faculty responsible for instructing/supervising preservice clinicians working with pediatric clients exhibiting communication/language disorders. This workshop series began in May and ended in December 1996. The writer coordinated flexible scheduling with the Clinic Coordinator to ensure that faculty

members could attend the technology workshops. Faculty training sessions, which lasted for 1 ½ hours each, were held during one of the two monthly supervisors meetings. There were eight monthly training sessions provided in which formal instruction, demonstration, facilitative discussions, and hands-on practice occurred. During the remaining weeks of each month of training, participants continued to develop/enhance their knowledge/skills through independent practice, review of suggested readings, and small group projects. The writer established individual and/or small group meeting times to be available for ongoing consultation and professional support, as requested by individual faculty members who participated in this practicum. The eight clinical supervisors participating in the technology training workshops were also completed the Self-Evaluation Rating of Technology Skills: Where Are You Now? (see Appendix C) and the Technology Training Workshop Program Evaluation (see Appendix E) for reasons previously stated.

Topics covered during the clinical supervisor's technology training workshops included those mentioned in the LDC tech lab curriculum, with the following modifications:

1. In regard to the various topics discussed, participants were asked to review articles by Larson & Steiner (1988), Cochran & Masterson (1995), Schwartz (1985), Long (1991), Long & Masterson (1993), Chial (1984, 1986b), Cochran et al. (1993), Wynne & Hurst (1995), and Cochran & Bull (1992), and review the book by Shelly, Cashman, Waggoner, & Waggoner (1995). Clinical supervisors either volunteered or were designated to lead facilitative discussions concerning information

presented by these authors.

2. In regard to CALSA hands-on practice sessions, the writer provided two formal training sessions, which included working on the SALT (Miller & Chapman, 1993) tutorial and an overview of the program manual. Participants preferred to practice inputting, coding, and interpreting computer-generated language sample analyses independently. The writer served as a consultant and provided direct input and feedback on an as needed basis, as requested by individual clinical supervisors.

3. Two of the technology training workshops were dedicated to small group assignments for the following purposes: (a) to develop a list of technology-based clinical competencies that preservice clinicians should demonstrate by the time they complete their academic coursework and clinical practica experiences at the university's speech-language-hearing training clinic, based upon the available technological resources at this facility; and (b) to discuss how technology could be incorporated into the academic courses and/or clinical labs they taught, what specific technologies would be needed and how they would be utilized, and what specific projects could be assigned to their students to facilitate clinical application of technology skills.

The Post-Implementation Technology Survey: Pediatric Language Assessment-Intervention (see Appendix B) was administered to graduate students in the Semester 1 group at the end August 1996, to graduate students in the Semester 2 group at the end of the December 1996, and to participating faculty members at the end of their technology training workshop sessions. The information obtained from this summative evaluation was used to determine if outcome measures were achieved.

The writer employed the leadership skills of discussion and dialogue to communicate the vision for a language analysis tech lab on campus. Through collaborative efforts with faculty and staff at the microcomputer lab, the writer was permitted to conduct the LDC tech labs and hold the faculty tech training workshop sessions at this facility. The writer also coordinated the purchase and installation of CALSA software and assisted in obtaining the necessary licensure agreements with the microcomputer lab personnel.

The writer assumed a leadership role within the department in order to effectively implement this proactive approach to integrate a technology-based clinical skills curriculum into the graduate level course in LDC and provide technology training for faculty members who supervise preservice clinicians working with pediatric clients exhibiting communicative/linguistic deficits. The writer communicated a vision in regard to the importance of preparing preservice clinicians to meet the ever changing needs of the profession and the demands of the marketplace, as a result of innovative, emerging technologies. Graduate students and faculty were motivated to increase their knowledge-base and world-mindedness about the uses of microcomputer technology in the pediatric language assessment-intervention clinical process. Graduate students quickly realized that learning these technology-based clinical skills would make them more marketable as they entered the workforce. Participating faculty were able to receive continuing education credits because the writer applied for and received ASHA approval to offer the technology training workshops as a continuing education activity. The writer used the leadership skills of humor, intelligence, and integrity to engage

participants in discussion and dialogue concerning ethical issues that impact upon the use of technology in the field of Speech-Language Pathology. Networking and team building strategies were emphasized among graduate students and faculty members in an effort to support each other so that participants were comfortable to partake in opportunities provided for hands-on technology experiences. The writer employed these leadership characteristics as well as encouraged faculty members to adopt these traits in order to present role models for graduate student clinicians to emulate.

In order to obtain permission from the Program Director and the Associate Director for Academic Curriculum to design a technology curriculum and add the technology lab to the LDC course, the writer took a calculated risk by presenting an outline of the new tech lab course proposal to members of the Curriculum Committee. All members voted unanimously for the writer to implement the technology curriculum and for the addition of a technology lab, which emphasized CALSA training, to the LDC course as a pilot project. The writer also took a risk by presenting the idea of a technology training workshop for faculty who supervise preservice clinicians working with pediatric clients to the Clinic Coordinator, who agreed to the plan. Both the Clinic Coordinator and members of the Curriculum Committee recommended to the Administrative Council that the LDC technology curriculum and lab and the technology training workshop for faculty be instituted into the graduate education/clinical preparation program in Communication Sciences and Disorders as a pilot program. The recommendation was conveyed to the Administrative Council, whose members included the Program Director, the Associate Director for Academic Curriculum, the Associate

Director for Operations and Marketing, the Clinic Coordinator, and the Coordinators for Research, Internships, and Doctoral Studies, who unanimously agreed as well.

Chapter V: Results

Results

The problem to be solved in this practicum was that preservice speech-language clinicians were not using cost-effective and time-efficient methods to analyze language sample assessment data to design functional treatment programs for children with communicative/linguistic deficits. Graduate students were not aware of new strategies to add to traditional assessment-intervention approaches that could optimize time and effectiveness. Preservice clinicians were not adequately educated in regard to computer applications appropriate for use in the pediatric assessment-intervention process. Topics addressing the use of microcomputer technology were not infused into any aspect of the graduate education/clinical preparation curriculum or practicum experiences. Additionally, research papers and/or projects incorporating the need for technology were not required in any course or clinical practicum by any clinical supervisor or instructor. Furthermore, the vast majority of faculty members were not incorporating computer-assisted instruction into their teaching practices and instructional strategies. To compound the problem, adequate space in the building which housed the speech-language-hearing clinic to design a technology lab with state-of-the-art equipment did not exist. Solution strategies selected to remediate the problem included:

1. Developing and implementing a technology lab as part of the requirements for the Language Disorders in Children course.

2. Designing a new curriculum that included topics pertinent to the use of technology-based clinical skills, with emphasis on CALSA applications.

3. Developing and implementing a series of technology training workshops for faculty members responsible for preparing preservice clinicians to work with pediatric clients exhibiting communication/language disorders.

4. Collaborating with faculty/staff at the microcomputer lab on campus for the following purposes: (a) to hold the LDC tech lab and faculty tech training workshops at their facility, (b) to coordinate the purchase and installation of CALSA software, and (c) to assist in obtaining the necessary licensure agreements.

The writer believed that these strategies constituted best-practice in regard to current trends to incorporate computer technology into the aspects of the academic and clinical curricula of a professional preparation program in Communication Sciences and Disorders. Technology-based clinical skills were also likely to make preservice clinicians more marketable as they prepared to enter the workforce. The goal of the practicum was that preservice clinicians would use cost-effective and time-efficient methods to analyze language sample assessment data to design functional treatment programs for children with communicative/linguistic deficits.

The following outcomes were projected for this practicum:

1. A post-implementation technology survey of graduate students enrolled in Language Disorders in Children (LDC) will reveal that 60 out of 75 rated their ability to code the content-form-use of a child's utterances using traditional language sample analysis approaches as good.

This outcome was not met.

Pre-implementation data obtained from the Self-Evaluation Rating of Technology Skills: Where Are You Now? (see Appendix C) revealed that only 7 out of 56 students rated their ability good. Ten rated their ability as fair, 12 rated their ability as poor, and 27 reported no experience.

The post-implementation technology survey (see Appendix B) data revealed that 47 out of 56 students rated their ability as good or better. Six of these 47 students rated their ability as excellent and 41 rated their ability as good. Nine other students rated their ability as fair.

2. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 65 out of 75 had experience with a computer-assisted language sample analysis (CALSA) software program.

This outcome was not met.

Pre-implementation data revealed that no students (0 out of 56) had any experience with CALSA applications.

Post-implementation data revealed that 56 out of 56 students had experience with at least one CALSA software program. Fifty six students reported that they had experience with SALT (Miller & Chapman, 1993). Thirty of these students reported that they also had experience with PELSA Plus (Weiner, 1995).

3. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 60 out of 75 rated their ability to code a child's utterances using a CALSA software program as good.

This outcome was not met.

Pre-implementation data revealed that 0 out of 56 students rated their ability as good. Fifty-two of these students reported that they had no ability. Three students rated their ability as fair and two rated their ability as poor.

Post-implementation data revealed that 47 out of 56 students rated their ability as good or better. Seven of these students rated their ability as excellent and 40 as good. Nine others rated their ability as fair.

4. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 60 out of 75 rated their ability to prepare a template using a word processor as good.

This outcome was not met.

Pre-implementation data revealed that only 9 out of 56 students rated their ability as good or better. Only one of these students rated her ability as excellent. Seven others rated their ability as fair, eight as poor, and 30 reported that they has no experience.

Post-implementation data revealed 46 out of 56 students rated their ability as good or better. Twenty-four of these students rated their ability as excellent and 22 as good. Ten other students rated their ability as fair.

5. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 65 out of 75 were familiar with literature addressing ethical concerns in the use of technology within the field of Speech-Language Pathology (SLP).

This outcome was not met.

Pre-implementation data revealed that no students (0 out of 56) were familiar with ethical issues addressed in the professional SLP literature. Thirty-seven of these

students reported that they were unfamiliar with ethical issues. However, 6 of these 56 students rated their familiarity as fair and 13 as poor. It is difficult to understand how these six students could report that they are unfamiliar with this literature and yet rate their ability as fair.

Post-implementation data revealed that 56 out of 56 students reported that they were familiar with this literature. Eleven rated their familiarity as excellent and 29 rated their familiarity as good. Fifteen rated their familiarity as fair and one rated her familiarity as poor.

6. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 60 out of 75 demonstrated adequate knowledge about areas of ethical concern that could be of major importance to the field, as evidenced by their ability to list more than three relevant comments.

This outcome was not met.

Pre-implementation data revealed that only 1 out of 56 students demonstrated adequate knowledge in this area, as evidenced by her ability to state more than three relevant comments. This student rated her confidence level in regard to discussing this literature as excellent. Fifteen students rated their confidence level as fair, seventeen as poor, and 23 reported that they were not confident in discussing this literature.

Post-implementation data revealed 13 out of 56 students demonstrated adequate knowledge in this area, as evidenced by their ability to list more than three relevant comments. Nineteen were able to list three and eight were able to list two relevant comments. Five were able to list one relevant comment and one student was unable to

list any relevant comments. From the students' perspective, 45 out of 56 students rated their confidence level as good or better. Eleven of these students rated their confidence level as excellent and 34 as good. Ten other students rated their confidence level as fair and one as poor.

7. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 65 out of 75 were familiar with guidelines suggested by ASHA for evaluating software.

This outcome measure was not met.

Pre-implementation data revealed that no students (0 out of 56) were familiar with these guidelines. Forty-seven of these students reported that they were unfamiliar with them. However, one student rated her familiarity as fair and seven as poor. It is difficult to understand how the student who reported that she was unfamiliar with software evaluation guidelines could then rate her ability as fair.

Post-implementation revealed that 55 out of 56 students reported that they were familiar with these guidelines. Six students rated their familiarity as excellent and 28 rated their familiarity as good. Twenty students rated their familiarity as fair and two rated their familiarity as poor.

8. A post-implementation technology survey of graduate students enrolled in LDC will reveal that 60 out of 75 demonstrated adequate knowledge about areas to consider when evaluating software for use in the pediatric speech-language assessment-intervention process, as evidenced by their ability to list more than three relevant comments.

This outcome was not met.

Pre-implementation data revealed that 0 out of 56 students demonstrated adequate knowledge in this area, as evidenced by their inability to state more than three relevant comments. Six students rated their confidence level as fair, seventeen as poor, and 33 reported that they were not confident in discussing these guidelines.

Post-implementation data revealed 16 out of 56 students demonstrated adequate knowledge in this area, as evidenced by their ability to list more than three relevant comments. Twenty-one were able to list three and fifteen were able to list two relevant comments. Four were able to list one relevant comment. From the students' perspective, 36 out of 56 students rated their confidence level as good or better. Six of these students rated their confidence level as excellent and 30 as good. Seventeen other students rated their confidence level as fair and three as poor.

Table 1 represents a comparison of pre- and post-implementation data for outcome measures 1 through 8 representing increased knowledge-base and proficiency level of graduate students in regard to technology-based clinical skills pertinent to the pediatric assessment-intervention process. Comparison of pre- and post-implementation data illustrates that graduate students demonstrated increased knowledge-base and proficiency level in regard to technology-based clinical skills addressed in this practicum.

Analysis of the data, however, indicates that outcome measures number 1 through 8 were not achieved to the degree projected.

Table 1

Comparison of Pre- and Post-Implementation Data Regarding Increased Knowledge and Proficiency in Technology-Based Clinical Skills of Graduate Students

Outcome	Criteria	Technology-Based Clinical Skills	Graduate Students Pre-Implementation Self-Eval Rating Tech Skills Survey N= 56	Graduate Students Post-Implementation Technology Survey N= 56
No.1	60 of 75	Code content-form-use: traditional manual approach	7	47
No. 2	65 of 75	Experience with CALSA application	0	56
No. 3	60 of 75	Code child's utterances using CALSA application	0	47
No. 4	60 of 75	Prepare template using word processor	9	46
No. 5	65 of 75	Familiarity with literature addressing ethical concerns	0	56
No. 6	60 of 75	Knowledge-base regarding ethical concerns	1	13

(table continues)

Outcome	Criteria	Technology-Based Clinical Skills	Graduate Students Pre-Implementation Self-Eval Rating Tech Skills Survey N= 56	Graduate Students Post-Implementation Technology Survey N= 56
No. 7	65 of 75	Familiarity with guidelines for software evaluation	0	55
No. 8	60 of 75	Adequate knowledge regarding software evaluation	0	16

9. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 6 out of 8 had experience with a CALSA software program.

This outcome was met.

Pre-implementation data obtained from the Self-Evaluation Rating of Technology Skills: Where Are You Now? (see Appendix C) revealed that only 1 out of 8 faculty members had experience with a CALSA software program.

The post-implementation technology survey (see Appendix B) data revealed that 8 out of 8 faculty members had experience with at least one CALSA software program. Eight supervisors reported that they had experience with SALT (Miller & Chapman, 1993). Six of these supervisors reported that they also had experience with PELSA Plus (Weiner, 1995).

10. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 5 out of 8 rated their ability to code a child's utterances using a CALSA software program as good.

This outcome was met.

Pre-implementation data revealed that 0 out of 8 faculty members rated their ability as good. Three reported that they had no ability. Four rated their ability as poor and one as fair.

Post-implementation data revealed that 8 out of 8 faculty members rated their ability as good or better. One reported excellent ability and seven rated their ability as good.

11. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 5 out of 8 rated their ability to prepare a template using a word processor as good.

This outcome was met.

Pre-implementation data revealed that only 2 out of 8 rated their ability as good or better. One of these clinical supervisors reported excellent ability and one reported good ability. One reported fair ability, three rated their ability as poor, and two reported that they had no experience.

Post-implementation data revealed that 7 out of 8 faculty members rated their ability as good or better. One reported excellent ability, 6 rated their ability as good, and one reported fair ability.

12. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 6 out of 8 were familiar with literature addressing ethical concerns in the use of technology within the field of SLP.

This outcome was met.

Pre-implementation data revealed that 4 out of 8 faculty members were familiar with ethical issues addressed in the professional SLP literature. One reported being unfamiliar with ethical issues. One reported excellent familiarity. Three rated their familiarity as fair and three as poor.

Post-implementation data revealed that 8 out of 8 faculty members reported that they were familiar with this literature. Eight supervisors rated their familiarity as good. The faculty member whose initial rating was excellent realized that there was a greater breadth and scope to the literature than originally thought.

13. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 5 out of 8 demonstrated adequate knowledge about areas of ethical concern that could be of major importance to the field, as evidenced by their ability to list more than three relevant comments.

This outcome was not met.

Pre-implementation data revealed that 0 out of 8 faculty members demonstrated adequate knowledge in this area, as evidenced by their inability to state more than three relevant comments. One rated confidence level as excellent, two as fair, and 4 as poor in

regard to discussing this literature. It is interesting to note that the faculty member whose rating was excellent in regard to confidence level was unable to state more than three ethical issues.

Post-implementation data revealed that 2 out of 8 faculty members demonstrated adequate knowledge in this area, as evidenced by their ability to state more than three relevant comments. Three were able to list three relevant comments and three were able to list one relevant comment. From the clinical supervisors' perspective, one rated confidence level as excellent, five as good, and two as fair in regard to discussing this literature. Although this outcome was not met to the degree projected, analysis of data reflected that faculty members were more knowledgeable in regard to ethical issues concerning the use of technology.

14. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 6 out of 8 were familiar with guidelines suggested by ASHA for evaluating software.

This outcome was met.

Pre-implementation data revealed that 2 out of 8 faculty members were familiar with these guidelines. They rated their confidence level as fair. Four rated their confidence level as poor. Two reported that they were unfamiliar with these guidelines.

Post-implementation data revealed that 8 out of 8 faculty members were familiar with these guidelines. Seven rated their familiarity as good as one as fair.

15. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 5

out of 8 demonstrated adequate knowledge about areas to consider when evaluating software for use in the pediatric assessment-intervention process, as evidenced by their ability to list more than three relevant comments.

This outcome was met.

Pre-implementation data revealed that 1 out of 8 faculty members demonstrated adequate knowledge in this area, as evidenced by the ability to state more than three relevant comments. One rated confidence level as excellent, two as fair, and three as poor. Two reported that they were unfamiliar with software evaluation guidelines and therefore reported no confidence.

Post-implementation data revealed that 5 out of 8 faculty members demonstrated adequate knowledge in this area, as evidenced by their ability to list more than three relevant comments. Three were able to list two relevant comments. From the clinical supervisors' perspective, one rated confidence level as excellent, five as good, and two as fair. It is interesting to note that one of the faculty members whose rating was good could only offer two relevant comments regarding software evaluation guidelines.

16. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 4 out of 8 will discuss topics related to the use of technology with their students as often as possible.

This outcome was not met.

Pre-implementation data revealed that only 1 out of 8 faculty members discussed topics related to microcomputer technology in courses taught. One clinical supervisor

rated confidence level as good, three as fair, and two as poor. Two reported that they did not discuss topics concerning technology at all.

Post-implementation data revealed that 3 out of 8 faculty members reported that they would discuss topics related to technology in courses taught as often as possible. Five stated they would do so to some degree. Although this outcome was not met to the degree projected, all participants expressed a commitment to infuse technology more so than had previously been done.

17. A post-implementation technology survey of faculty members who supervise/instruct preservice clinicians working with pediatric clients will reveal that 4 out of 8 will assign research papers and/or projects that incorporate the use of technology into their academic courses and/or clinical labs as often as possible.

This outcome was not met.

Pre-implementation data revealed that 0 out of 8 faculty members assigned research paper/projects incorporating technology into courses taught.

Post-implementation data revealed that 2 out of 8 stated that they would do so as often as possible. Three reported they would do so to some degree. Three indicated that they would seldom do so because they did not feel confident enough with their skill level at this time.

Table 2 illustrates a comparison of pre- and post-implementation data for outcome measures 9 through 17 representing increased knowledge-base and proficiency levels of clinical supervisors in regard to technology-based clinical skills pertinent to the pediatric assessment-intervention process.

Table 2

Comparison of Pre- and Post-Implementation Data Regarding Increased Knowledge and Proficiency in Technology-Based Clinical Skills of Clinical Supervisors

Outcome	Criteria	Technology-Based Clinical Skills	Clinical Supervisors Pre-Implementation Self-Eval Rating Tech Skills Survey N= 8	Clinical Supervisors Post-Implementation Technology Survey N= 8
No. 9	6 of 8	Experience with CALSA application	1	8
No. 10	5 of 8	Code child's utterances using CALSA application	0	8
No. 11	5 of 8	Prepare template using word processor	2	7
No. 12	6 of 8	Familiarity with literature addressing ethical concerns	4	8

(table continues)

Outcome	Criteria	Technology-Based Clinical Skills	Clinical Supervisors Pre-Implementation Self-Eval Rating Tech Skills Survey N= 8	Clinical Supervisors Post-Implementation Technology Survey N= 8
No. 13	5 of 8	Knowledge-base regarding ethical concerns	0	2
No. 14	6 of 8	Familiarity with guidelines for software evaluation	2	8
No. 15	5 of 8	Adequate knowledge regarding software evaluation	1	5
No. 16	4 of 8	Discuss topics concerning uses of technology with students	1	3
No. 17	4 of 8	Assign research paper/projects incorporating technology	0	2

Comparison of pre- and post-implementation data illustrates that outocme measures 9, 10, 11, 12, 14, and 15 were achieved. Faculty members demonstrated increased knowledge-base and proficiency level in regard to these technology-based clincal skills.

Analysis of the data indicates that participants knowledge-base and proficiency level in regard to technology-based clinical skills addressed in outcome measures number 13, 16, and 17 improved significantly, although these outcomes were not met to the degree projected.

Discussion

The goal of this practicum was that preservice speech-language clinicians will use cost-effective and time-efficient methods to analyze language sample assessment data to design functional treatment programs for children with communicative/linguistic deficits. Strategies and techniques constituting best-practice in regard to current trends to incorporate computer technology into the academic and clinical components of a graduate level preparation program in speech-language pathology were drawn from the literature spanning several professional disciplines (e.g., ASHA, 1992; Bermejo, 1985; Chial, 1984, 1986a, 1986b; Cochran, 1989; Cochran & Bull, 1992, 1993; Cochran & Masterson, 1995; Ferguson, 1993; Ford, 1993; Greyerbiehl, Schwartz, Clymer, Owens, & Blackstone, 1986; Howard 1986b; Hughes, Lehman, Scukanec, &Tatchell, 1993; Kuster, 1996a, 1996b; Larson & Steiner, 1988; Long 1991; Long & Masterson 1993; Miller & Chapman, 1993; Miller & Lyngaas. 1995; Schwartz, 1985; Shelly, Cashman, Waggoner, & Waggoner, 1995; Thronburg, 1991, 1992, 1994, 1995; Silverman, 1987; Weiner 1995; Wynne & Hurst, 1995; Zangari & Newby, 1991). These along with other previously cited authors' philosophies regarding technology-based clinical skills were adapted and instituted into the academic and clinical component of Language Disorders in Children, a required graduate level course in the speech-language pathology training program.

The practicum was considered to be moderately successful by the writer and faculty and administration of the Master's Program in Speech-Language Pathology. There were two sets of outcomes projected for this practicum. The first set (see outcomes number 1-8) were designed to improve knowledge and increase proficiency level of graduate student clinicians in regard to technology-based clinical skills pertinent to the pediatric language assessment-intervention process, with an emphasis on CALSA. Based upon a comparison of pre- and post-implementation data, analysis indicated that considerable gains were made (see Table 1), although these outcomes were not met to the degree projected. A number of factors possibly contributing to these outcome measures not being achieved to the degree anticipated warrant discussion.

The first factor involved changes in student enrollment patterns. There was a decrease in the number of graduate students expected to enroll for LDC during the two semesters in which this practicum was implemented. At the proposal phase, the writer was informed by the faculty advisor responsible for developing all students' plans of study, that there would be approximately 75 students enrolling for LDC over the Spring-Summer and Fall 1996 semesters. Since that time there were changes in regard to which courses students could enroll in when they began their graduate level studies. Traditionally, all students took LDC as one of their first graduate level courses. Due to an increased student enrollment within the Master's Program in Speech-Language Pathology coupled with the resignation of a full-time faculty member who taught some of the pediatric communication disorders courses, alternate strategies had to be determined in order to ensure for reasonable class sizes. This was important to both faculty and

students because it allowed for theory-to-practice instructional activities, which were an integral part of the philosophy upon which the Programs in Communication Sciences and Disorders as well as the university were based. A plan developed by the Curriculum Committee, of which the writer was a member, in conjunction with the Admissions Committee and Administrative Council was implemented. This plan involved developing two graduate study tracks. Students assigned to the pediatric study track were permitted to enroll for LDC at the beginning of their graduate level coursework whereas students assigned to the adult study track enrolled for communication disorders classes that focused upon adult clinical populations. At the midpoint of their clinical education preparation, students would be switched to the alternate track. The expected student enrollment of 75 for LDC therefore declined to 56, as a result of this new plan of study requirement. This factor is of particular importance in regard to outcome number 2, 5, and 7.

The second factor may have had to do with the attendance expectation for the LDC tech lab. Regular attendance was strongly recommended, however, formal attendance was not taken nor was attendance factored into the final grading process. Students were, however, informed both verbally and in writing in the LDC tech lab syllabus that they were responsible for obtaining notes, handouts, and any other material covered in class as well as for completing required reading and hands-on CALSA assignments covered during their absence(s). It is possible that students who were absent when topics pertaining to ethical issues and/or software evaluation were discussed failed

to meet their responsibility. This possible factor is of particular importance in regard to outcome number 6 and 8.

The third possible factor had to do with students' perceptions of their knowledge-base and technology-based clinical skill levels as compared with that of the instructor. In regard to the required CALSA project, which included a traditional manual component to coding utterances obtained from a child's language sample, 13 students received a grade of "A", 12 received a grade of "B+", and 31 students received a grade of "B". From the writer's perspective these grades reflected a rating of good-to-excellent skill levels. The nine students who rated themselves as having fair skills may have had unrealistic expectations in regard to what constituted good skills for the level at which they were at in their preservice training. This factor is of particular importance in regard to outcome number 1 and 3.

Cooper & Gelatt (1995), Higginbotham & Lawrence-Dederich (1992), Hughes, Lehman, Scukanec, & Tatchell (1993) and Zangari & Newby (1991) discussed strategies to incorporate computer technology into graduate level academic and clinical curricula in university-based speech-language pathology training programs. Chial (1986a) stated objectives that could be achieved by developing a strategic plan to accomplish that goal. In an effort to infuse technology into the academic/clinical curricula, the LDC Tech Lab was instituted into the LDC course that was taught by the writer. Analysis of data indicated that preservice clinicians increased their knowledge-base and acquired technology-based, clinically relevant skills as a result of the LDC tech curriculum (see outcomes 1 through 9).

The second set (see outcomes number 9-17) were designed to enhance knowledge and increase proficiency level of faculty members responsible for instructing/supervising preservice clinicians working with pediatric clients who exhibited communication/language disorders in regard to technology-based clinical skills pertinent to the pediatric language assessment-intervention process, with an emphasis on CALSA. Six out of these nine anticipated outcomes were successfully achieved (see outcome statements numbered 9, 10, 11, 12, 14, and 15 and Table 2). Of the three outcomes that were not met to the degree projected, considerable gains were attained in regard to a greater breadth and scope of knowledge pertaining to technology-based clinical skills, based upon a comparison of pre- and post-implementation data (see outcome statements numbered 13, 16, and 17 and Table 2).

On the comment section of the Technology Training Workshop Program Evaluation (see Appendix E) three supervisors expressed that more time was needed for topics concerning ethical issues and CAI. This appeared to be the primary factor as to why outcome number 13, 16, and 17 were not achieved.

Seaton, Richards, & Harter (1985) described strategies to encourage and motivate faculty to accept and use computer technology. In an effort to enhance clinical supervisors' knowledge and skills regarding the use of computers in the clinical process, the writer designed a series of hands-on technology training sessions. Analysis of pre- and post-implementation data reflected considerable gains in faculty members' confidence and proficiency levels as well as knowledge-base in regard to technology-

based clinical skills pertinent to the pediatric assessment-intervention process (see outcome statements numbered 9 through 17).

Several authors have attested to the importance of language sample analysis procedures in the pediatric assessment-intervention process (Fox & Wilson, 1986; Long, 1991; Long & Masterson, 1993; Miller & Lyngaas, 1995; Schwartz, 1985). Another successful indicator of the practicum was the greater breadth and scope of knowledge and technology-based clinical skills the participants acquired in regard to CALSA. This is clearly evidenced by the analysis and comparison of the pre- and post-implementation data from outcome statements numbered 2, 3, 9, and 10.

Another positive result of the practicum pertained to ratings and/or comments expressed by graduate students on the LDC Technology Lab Evaluation (see Appendix D) and by clinical supervisors on the Technology Training Workshop Program Evaluation (see Appendix E). Forty-three students and six faculty members stated that they felt using CALSA was more cost-effective and time-efficient than traditional manual approaches to language sample analysis, once the time was invested to learn the particular CALSA application. Twenty-two students and two faculty members "strongly agreed" and 32 students and six faculty members "agreed" that they would seek additional information pertaining to the topics addressed in the technology training lab and workshop sessions. Twenty students and five faculty member "strongly agreed" and thirty-four students and three faculty members "agreed" that the training provided them with useful, clinically applicable information concerning the role of technology in the

pediatric assessment-intervention clinical process which was helpful to their professional growth.

Some authors have discussed technology competencies critical for all speech-language pathologists and audiologists (Cochran, 1989; Cochran & Bull, 1992; Cochran et al., 1993, Wynne , 1991). Another positive indicator as to the success of the practicum was that clinical supervisors were able to generate ideas concerning computer-based clinical competencies thought to be important for preservice clinicians to demonstrate upon completion of their graduate level training. Additional ones to those previously referred to in the LDC Tech Lab curriculum and reflected in outcomes one through nine included:

1. Use the computer as an augmentative/alternative communication device.
2. Evaluate and select appropriate computer adaptations (peripherals) for physically-challenged clients.
3. Use the computer as a biofeedback device and a clinical management productivity tool.
4. Use the computer to facilitate decision-making in regard to various aspects of the clinical process.

The use of CAI within the communication sciences and disorders curriculum has also been addressed (Bermejo, 1995; Cochran & Bull, 1992; Silverman, 1987, Zangari & Newby, 1991). Faculty members generated suggestions to incorporate CAI into courses taught. These included:

1. Teach students to conduct phonological and fluency analyses using

computer-assisted applications. This can be incorporated in the Phonological Disorders and Fluency courses, respectively.

2. Teach students to score various standardized tests using computer programs for those available measures. This can be incorporated in the Diagnostics course and practicum.

3. Teach students to generate templates for all clinical documents. This could be incorporated into the Clinical Methods and Lab courses as well as the diagnostic and clinical (therapy) practicums.

4. Develop a file of case studies in which students could respond to drill-and-practice exercises and clinical scenarios regarding the assessment-intervention process. This could be incorporated into any of the communication disorders courses as it pertains to specific populations and/or clients.

Based upon the overall results of the practicum, the writer concluded the following:

1. It is important for academicians and clinical supervisors to take a leadership role and act as critical change-agents to infuse technology into graduate level education/clinical training in speech-language pathology. Higher educators involved in training preservice clinicians have an ethical responsibility to prepare our students to be technologically competent so they are competitive and able to meet the demands of the professional market.

2. Any attempt to incorporate technology into the communication sciences and disorders curriculum must be congruous with a philosophy of theory-to-practice

principles pertaining to the clinical assessment-intervention process and consistent with ones theoretical beliefs in regard to speech-language development.

3. Microcomputer technology will not replace pediatric speech-language pathologists, however, clinicians who are knowledgeable, clinically competent, and innovative users of technology are likely to replace those who are not!

Recommendations

The following recommendations are suggested to faculty and administrators who seek to incorporate computer technology into aspects of the communication sciences and disorders academic and/or clinical curricula. They are also applicable for speech-language pathologists and audiologists, other health related professionals, educators, and administrators who are interested in incorporating microcomputer technology into their professional work setting. These recommendations constitute a philosophy of best-practice in regard to infusing computer technology into clinical/education professional preparation programs:

1. Conduct a needs assessment for the following purposes: (a) to provide support for computer technology preservice and/or inservice training; (b) to determine knowledge-base, skill level comfort/confidence level, attitude towards technology and infusing it into the workplace; and (c) to decide what are the most significant technology-based skills to develop/enhance during the training program.

2. Develop a plan for flexible scheduling so that participants can attend training sessions as part their responsibilities during work time.

3. Create incentives to motivate participants to attend training sessions.

4. Ensure equal access to computers and software applications used for training to all participants.

5. Obtain appropriate licensure agreements and abide by ethical standards. Be sure that all participants are aware of licensure requirements and ethical issues surrounding the use of computer technology as well.

6. Create a safe, non-threatening environment so that participants can feel free to collaborate, discuss, make errors, be humorous, and take risks regarding the use of computer technology.

7. Provide as many opportunities for hand-on experiences and verbal and written feedback to participants as possible.

8. Conduct periodic program evaluations to determine the extent to which technology training is effective from the participants' perspective.

The following recommendations are suggested to administrators and faculty in the writer's work setting to further incorporate computer technology into the academic and clinical components of the communication sciences and disorders preparation program:

1. An Administrative Council discussion and vote to permanently institute the LDC Tech Lab into the existing speech-language pathology graduate program.

2. The LDC Tech Lab could be an added component to the required LDC course and offered for 1 academic credit.

3. The required student orientation to the Communication Sciences and Disorders Program could include a technology orientation component as well . Topics

pertaining to basic operating systems, an overview of available telecommunications software, guidelines for evaluating hardware and software, and ethical concerns regarding the use to computer technology could be included. A portion of the training could be conducted at the microcomputer lab on campus so that hand-on experiences could provided.

4. A similar technology orientation workshop could be developed and offered to new faculty each semester, as needed.

5. As part of the annual department budget, monies could be designated specifically for the purchase of educational software.

6. Members of the department's Curriculum and Technology/Library Committees could explore ways to infuse CAI into other aspects of the academic curriculum and clinical coursework. Faculty incentives for continued professional development pertaining to CAI area could be offered.

7. Members of the department's Curriculum and Clinic Committees could explore ways to ensure that students would be provided with ample opportunities to achieve the technology-based clinical competencies that clinical supervisors who participated in this practicum thought were important.

Dissemination

Colleagues from within the writer's department and at other universities have expressed a considerable degree of support for this practicum. The writer has been encouraged to submit a proposal to present this practicum at the ASHA Annual Convention and at the Florida State Association for Speech-Language Pathologists and

Audiologists Annual Conference. Additionally, the Director, Associate Director, and Coordinator for Curriculum and Instruction for Programs in Communication Sciences and Disorders has asked the writer to submit a proposal to make the LDC Tech Lab a permanent part of the LDC course curriculum. Furthermore, as a result of designing and implementing this practicum, the writer was asked to guest author an article addressing the need to integrate computer technology in the pediatric assessment-intervention clinical process. Griffer (1996) discussed the roles of software applications as a method of delivering language intervention services to young children and discussed cost-effective, innovative distance education technologies that can be used for preparing preservice early intervention personnel.

The writer had the pleasure of meeting one of the authors of SALT (Miller & Chapman, 1993) at the 1996 ASHA Annual Convention in Seattle, WA. This author expressed an interest in reviewing the practicum report. Submission of this practicum report for inclusion to the Education Resource Information Center (ERIC) database is also being considered.

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APPENDIX A

PRE-IMPLEMENTATION TECHNOLOGY SURVEY: PEDIATRIC LANGUAGE ASSESSMENT-INTERVENTION

Pre-Implementation Technology Survey:
Pediatric Language Assessment-Intervention

Please check: Graduate Student _____ Date:___/___/___
Faculty _____

The purpose of this survey is to determine preservice clinician/faculty understanding and familiarity with the use of technology in the pediatric language assessment-intervention process. Your input will be particularly useful in developing new curriculum for the graduate education clinical training program. I would appreciate it if faculty would place completed surveys in my mailbox within one week. Graduate students should return completed surveys to their instructor for Language Disorders in Children by the next class meeting. Thank you for your cooperation.

1. Are you familiar with any of the following computer operating systems?

   a) MS-DOS Yes ____ No ____

   b) Windows Yes ____ No ____

   c) Apple/Macintosh Yes ____ No ____

2. Have you had experience in using any of the following computer operating systems?

   a) MS-DOS Yes ____ No ____

   b) Windows Yes ____ No ____

   c) Apple/Macintosh Yes ____ No ____

3. Please rate yourself on your ability to use a word processing program.

   Excellent ___ Good ___ Fair ___ None ___

4. Please rate your ability to prepare a template using a word processor.

   Excellent ___ Good ___ Fair ___ None ___

5. Please rate your ability to prepare a table using a word processor.

   Excellent ___ Good ___ Fair ___ None ___

6. Are you familiar with how a database works?

   Yes ____ No ____

7. Please rate your ability to set up fields and enter records in a database.

   Excellent ___ Good ___ Fair ___ None ___

8. Please rate your ability to code the content-form-use of a child's utterances.

   Excellent ___ Good ___ Fair ___ None ___

9. Please rate your ability to code a child's utterances using a Computer-Assisted Language Sample Assessment (CALSA) software program.

   Excellent ___ Good ___ Fair ___ None ___

10. Please check the following CALSA software program(s) with which you have had experience.

    a) PELSA Plus ___

    b) SALT Basic ___

    c) Computerized Profiling ___

    d) Other (please identify) _____

11. Are you familiar with the literature that addresses ethical concerns in the use of technology within the field of Speech-Language Pathology?

    Yes ____ No ____

12. Are you familiar with the guidelines that the American Speech-Language-Hearing Association (ASHA) has suggested for evaluating software?

    Yes ____ No ____

13. Please itemize those areas of ethical concern you feel could be of major importance to the field.

    _____

    _____

    _____

    _____

    _____

14. Please list those items that you feel are important in evaluating software for use in speech-language assessment-treatment.

    _____

    _____

    _____

    _____

    _____

FACULTY ONLY

15. To what extent do you discuss topics relating to the use of technology in your classes?

Often ____ To some degree ____ Seldom ____ Never ____

16. To what extent do you use Computer-Assisted Instruction (CAI) in the courses that you teach?

Often ____ To some degree ____ Seldom ____ Never ____

17. To what extent do you assign research papers and/or projects incorporating the use of technology into your academic courses and/or clinical labs?

Often ____ To some degree ____ Seldom ____ Never ____

18. Please list any software you may be using in your courses and briefly describe your rationale for its use.

Software	Use in your Course

19. Please list any software that you might be interested in using with your graduate students but as yet have not had an opportunity to acquire or integrate into your curriculum.

_____

_____

_____

APPENDIX B

POST-IMPLEMENTATION TECHNOLOGY SURVEY: PEDIATRIC LANGUAGE ASSESSMENT-INTERVENTION

Post-Implementation Technology Survey:
Pediatric Language Assessment-Intervention

Please check: Graduate Student _____ Date:___/___/___
Faculty _____

The purpose of this survey is to determine preservice clinician/faculty understanding and familiarity with the use of technology in the pediatric language assessment-intervention process following the technology-based clinical skills training labs/workshops.

1. Please check the following CALSA software program(s) with which you have had experience.

   a) PELSA Plus ___

   b) SALT Basic ___

   c) Computerized Profiling ___

   d) Other (please identify) _____

2. Please rate your ability to code a child's utterances using a Computer-Assisted Language Sample Assessment (CALSA) software program.

   Excellent ___ Good ___ Fair ___ None ___

3. Please rate your ability to prepare a template using a word processor.

   Excellent ___ Good ___ Fair ___ None ___

4. Are you familiar with the literature that addresses ethical concerns in the use of technology within the field of Speech-Language Pathology?

   Yes ___ No ___

5. Are you familiar with the guidelines that the American Speech-Language-Hearing Association (ASHA) has suggested for evaluating software?

   Yes ____ No ____

6. Please itemize those areas of ethical concern you feel could be of major importance to the field.

   _____

   _____

   _____

   _____

   _____

7. Please list those items that you feel are important in evaluating software for use in speech-language assessment-treatment.

   _____

   _____

   _____

   _____

   _____

GRADUATE STUDENTS ONLY

8. Please rate your ability to code the content-form-use of a child's utterances using traditional language sample analysis approaches.

Excellent ___ Good ___ Fair ___ None ___

FACULTY ONLY

9. To what extent will you discuss topics relating to the use of technology in your classes?

Often ____ To some degree ____ Seldom ____ Never ____

10. To what extent will you assign research papers and/or projects incorporating the use of technology into your academic courses and/or clinical labs?

Often ____ To some degree ____ Seldom ____ Never ____

APPENDIX C

SELF-EVALUATION RATING OF TECHNOLOGY SKILLS:
WHERE ARE YOU NOW?

Self-Evaluation Rating of Technology Skills:
Where Are You Now?

Date:____/____/____

Name: Graduate Student _____
Faculty _____

The purpose of this self-evaluation is to determine the level at which participants feel they are in regard to technology-based applied clinical skills and knowledge in the pediatric language assessment-intervention process. Please read each item and circle the one answer that is best for you.

5 = Excellent 4 = Good 3 = Fair 2 = Poor 1 = None

1. Rate your experience with the following computer operating systems:

MS-DOS	5	4	3	2	1
Windows	5	4	3	2	1
Apple/Macintosh	5	4	3	2	1

2. Rate your ability to use a word processing program. 5 4 3 2 1

3. Rate your ability to prepare a template using a word processor. 5 4 3 2 1

4. Rate your ability to code a child's utterances using a Computer-Assisted Language Sample Assessment (CALSA) software program. 5 4 3 2 1

5. Rate your ability to use any of the following CALSA software program(s) with which you have had experience:

a)	PELSA Plus	5	4	3	2	1
b)	SALT Basic	5	4	3	2	1
c)	Computerized Profiling	5	4	3	2	1
d)	Other (please identify below)	5	4	3	2	1

_____

6. Rate your familiarity with the literature that addresses ethical concerns in the use of technology within the field of Speech-Language Pathology:

5 4 3 2 1

7. Rate your familiarity with the guidelines that the American Speech-Language-Hearing Association (ASHA) has suggested for evaluating software:

5 4 3 2 1

8. Rate your level of confidence in discussing areas of ethical concern you feel could be of major importance to the field.

5 4 3 2 1

9. Rate your level of confidence in discussing items that you feel are important in evaluating software for use in speech-language assessment-treatment.

5 4 3 2 1

Graduate Students Only

10. Rate your ability to code the content-form-use of a child's utterances using traditional language sample analysis approaches.

5 4 3 2 1

Faculty Only

11. Rate your ability to integrate topics related to the use of technology in speech-language assessment-intervention in the courses you teach.

5 4 3 2 1

APPENDIX D

LDC TECHNOLOGY LAB EVALUATION

LDC Technology Lab Evaluation

Please answer each question by selecting a number from the scale of 1 to 5 listed below, and entering it on the line provided.

5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly Disagree

LDC TECHNOLOGY LAB CONTENT

____1. The content of the LDC Technology Lab met my expectations.
____2. The level of difficulty of these labs was appropriate for the graduate students.
____3. The material was offered in a straight forward easy-to-understand manner.
____4. The information discussed provided me with new knowledge and/or skills.
____5. The topics discussed added to my professional knowledge.

INSTRUCTOR EFFECTIVENESS

____1. The LDC Technology Lab time was used effectively.
____2. Presentation style was conducive to learning.
____3. The instructor provided examples of and opportunities for technology-based clinical skills.
____4. The instructor made good use of visual aids such as overheads and computer data-show projections.
____5. The instructor demonstrated substantial knowledge of the subject matter.
____6. I would enjoy taking another lab/course from this instructor.

TEACHING AIDS

____1. The recommended readings were current and enhanced my understanding of topics discussed.
____2. The handouts served as an effective resource to facilitate learning.
____3. The visual aids provided a clearer understanding of the subject matter.

EVALUATION OF LEARNING

____1. The knowledge gained from these tech labs will make a difference in my professional preparation as a speech-language clinician.
____2. I will seek additional information about the technology topics covered in the tech labs.
____3. I will use the proficiencies gained from the tech labs in my diagnostic and therapy practicum experiences.
____4. The tech labs provided me with useful information concerning the use of technology in the pediatric language assessment-intervetnion clinical process.
____5. The tech labs have positively affected my clincial professional growth.
____6. The information and skills gained can be applied to practical clinical situations.

COMMENTS AND RECOMMENDATIONS

APPENDIX E

TECHNOLOGY TRAINING WORKSHOP PROGRAM EVALUATION

Technology Training Workshop Program Evaluation

Please answer each question by selecting a number from the scale of 1 to 5 listed below, and entering it on the line provided.

5 = Strongly Agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly Disagree

TECHNOLOGY WORKSHOP CONTENT

____1. The content of the Technology Training Workshops met my expectations.
____2. The level of difficulty of these workshops was appropriate for the intended audience.
____3. The material was offered in a straight forward easy-to-understand manner.
____4. The information discussed provided me with new knowledge and/or skills.
____5. The topics discussed added to my professional knowledge.

INSTRUCTOR EFFECTIVENESS

____1. The Technology Training Workshop time was used effectively.
____2. Presentation style was conducive to learning.
____3. The instructor provided examples of and opportunities for technology-based clinical skills.
____4. The instructor made good use of visual aids such as overheads and computer data-show projections.
____5. The instructor illustrated substantial knowledge of the subject matter.
____6. I would enjoy taking another workshop from this instructor.

TEACHING AIDS

____1. The recommended readings were current and enhanced my understanding of topics discussed.
____2. The handouts served as an effective resource to facilitate learning.
____3. The visual aids provided a clearer understanding of the subject matter.

EVALUATION OF LEARNING

____1. The knowledge gained from these workshops will make a difference in my work.
____2. I will seek additional information about the technology topics covered in the workshops.
____3. I will use the proficiencies gained from the workshops in my work.
____4. The workshops provided me with useful information concerning the use of technology in my work.
____5. The workshops have affected my professional growth.
____6. The information and skills gained can be applied to practical clinical situations.

COMMENTS AND RECOMMENDATIONS